Bohr model for many-electron atoms (many-dimensional space)

Optimal configurations and minimal energy are calculated for all known elements, assuming that the n-th shell with m electrons forms a regular $m-1$-dimensional simplex, with all distances between electrons and the center equal to R_n. Subspaces of simplexes corresponding to different shells are assumed to be orthogonal. All simlexes are assumed to be co-centric with the nucleus, except the case when the outer shell has only one electron. In the latter case, centers of simplexes are assumed to be shifted in some direction orthogonal to all simplexes.

1. Hydrogen atom - 1 electrons.

Electron configuration $1s^1$.

Electron shell configuration $\{1\}$.

Number of shells: 1

Energy function:

$$W = \frac{1}{2d_1^2} - \frac{1}{d_1}$$

Radii of shells:

$$\{\}$$

Displacements of shells:

$$d_1 = 1.$$

Energy: $E = -0.500000000$ (0.% accuracy).

2. Helium atom - 2 electrons.

Electron configuration $1s^2$.

Electron shell configuration $\{2\}$.

Number of shells: 1

Energy function:

$$W = \frac{1}{R_1^2} - \frac{7}{2R_1}$$

Radii of shells:

$$R_1 = 0.571429$$

Energy: $E = -3.06250000$ (5.5% accuracy).

3. Lithium atom - 3 electrons.

Electron configuration [He]$2s^1$.

Electron shell configuration $\{2, 1\}$.

Number of shells: 2

Energy function:

$$W = \frac{2}{\sqrt{(d_1 - d_2)^2 + R_1^2}} - \frac{3}{d_2} + \frac{1}{2R_1} + \frac{2}{d_2^2} - \frac{6}{\sqrt{d_1^2 + R_1^2}} + \frac{1}{d_1^2 + R_1^2}$$

Radii of shells:

$$R_1 = 0.363585$$

Displacements of shells:

$$d_1 = -0.0126811$$

$$d_2 = 3.84895$$

Energy: $E = -7.69045700$ (2.8% accuracy).

4. Beryllium atom - 4 electrons.

Electron configuration [He]$2s^2$.

Electron shell configuration $\{2, 2\}$.

Number of shells: 2

Energy function:

$$W = -\frac{15}{2R_1} - \frac{15}{2R_2} + \frac{1}{R_1^2} + \frac{4}{R_2^2} + \frac{4}{\sqrt{R_1^2 + R_2^2}}$$

Radii of shells:

$$R_1 = 0.266905$$

$$R_2 = 2.23196$$

Energy: $E = -14.8403479$ (1.2% accuracy).

5. Boron atom - 5 electrons.

Electron configuration [He]$2s^2 2p^1$.

Electron shell configuration $\{2,3\}$.

Number of shells: 2

Energy function:

$$W = -\frac{19}{2R_1} + \frac{\sqrt{3}}{R_2} - \frac{15}{R_2} + \frac{1}{R_1^2} + \frac{6}{R_2^2} + \frac{6}{\sqrt{R_1^2 + R_2^2}}$$

Radii of shells:

$$R_1 = 0.210814$$

$$R_2 = 1.61777$$

Energy: $E = -24.7935809$ (0.57% accuracy).

6. Carbon atom - 6 electrons.

Electron configuration [He]$2s^2 2p^2$.

Electron shell configuration $\{2,4\}$.

Number of shells: 2

Energy function:

$$W = -\frac{23}{2R_1} + \frac{3\sqrt{\frac{3}{2}}}{R_2} - \frac{24}{R_2} + \frac{1}{R_1^2} + \frac{8}{R_2^2} + \frac{8}{\sqrt{R_1^2 + R_2^2}}$$

Radii of shells:

$$R_1 = 0.174213$$

$$R_2 = 1.27546$$

Energy: $E = -37.8662499$ (0.063% accuracy).

7. Nitrogen atom - 7 electrons.

Electron configuration [He]$2s^2 2p^3$.

Electron shell configuration $\{2,5\}$.

Number of shells: 2

Energy function:

$$W = -\frac{27}{2R_1} + \frac{2\sqrt{10}}{R_2} - \frac{35}{R_2} + \frac{1}{R_1^2} + \frac{10}{R_2^2} + \frac{10}{\sqrt{R_1^2 + R_2^2}}$$

Radii of shells:

$$R_1 = 0.148446$$

$$R_2 = 1.05455$$

Energy: $E = -54.3720983$ (-0.39% accuracy).

8. Oxygen atom - 8 electrons.

Electron configuration [He]$2s^2 2p^4$.

Electron shell configuration $\{2, 6\}$.

Number of shells: 2

Energy function:

$$W = -\frac{31}{2R_1} + \frac{5\sqrt{15}}{2R_2} - \frac{48}{R_2} + \frac{1}{R_1^2} + \frac{12}{R_2^2} + \frac{12}{\sqrt{R_1^2 + R_2^2}}$$

Radii of shells:

$$R_1 = 0.129321$$

$$R_2 = 0.899544$$

Energy: $E = -74.6246524$ (-0.58% accuracy).

9. Fluorine atom - 9 electrons.

Electron configuration [He]$2s^2 2p^5$.

Electron shell configuration $\{2, 7\}$.

Number of shells: 2

Energy function:

$$W = -\frac{35}{2R_1} + \frac{3\sqrt{21}}{R_2} - \frac{63}{R_2} + \frac{1}{R_1^2} + \frac{14}{R_2^2} + \frac{14}{\sqrt{R_1^2 + R_2^2}}$$

Radii of shells:

$$R_1 = 0.114562$$

$$R_2 = 0.784569$$

Energy: $E = -98.9373800$ (-0.78% accuracy).

10. Neon atom - 10 electrons.

Electron configuration [He]$2s^2 2p^6$.

Electron shell configuration $\{2, 8\}$.

Number of shells: 2

Energy function:

$$W = -\frac{39}{2R_1} + \frac{7\sqrt{7}}{R_2} - \frac{80}{R_2} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{16}{\sqrt{R_1^2 + R_2^2}}$$

Radii of shells:

$$R_1 = 0.102828$$

$$R_2 = 0.695804$$

Energy: $E = -127.623726$ ($-1.\%$ accuracy).

11. Sodium atom - 11 electrons.

Electron configuration [Ne]$3s^1$.

Electron shell configuration $\{2, 8, 1\}$.

Number of shells: 3

Energy function:

$$\begin{aligned} W \;=\; & \frac{2}{\sqrt{(d_1-d_3)^2+R_1^2}} - \frac{88}{\sqrt{d_2^2+R_2^2}} + \frac{8}{\sqrt{(d_2-d_3)^2+R_2^2}} + \frac{16}{\sqrt{(d_1-d_2)^2+R_1^2+R_2^2}} \\ & - \frac{11}{d_3} + \frac{1}{2R_1} + \frac{7\sqrt{7}}{R_2} + \frac{16}{d_2^2+R_2^2} + \frac{9}{2d_3^2} - \frac{22}{\sqrt{d_1^2+R_1^2}} + \frac{1}{d_1^2+R_1^2} \end{aligned}$$

Radii of shells:

$$R_1 = 0.093285$$

$$R_2 = 0.591989$$

Displacements of shells:

$$d_1 = -0.000115621$$

$$d_2 = 0.00133179$$

$$d_3 = -8.48368$$

Energy: $E = -160.632373$ (-0.99% accuracy).

12. Magnesium atom - 12 electrons.

Electron configuration [Ne]$3s^2$.

Electron shell configuration $\{2,8,2\}$.

Number of shells: 3

Energy function:

$$W=\frac{4}{\sqrt{R_1^2+R_3^2}}+\frac{16}{\sqrt{R_2^2+R_3^2}}-\frac{47}{2R_1}+\frac{7\sqrt{7}}{R_2}-\frac{96}{R_2}-\frac{47}{2R_3}+\frac{1}{R_1^2}+\frac{16}{R_2^2}+\frac{9}{R_3^2}+\frac{16}{\sqrt{R_1^2+R_2^2}}$$

Radii of shells:

$$R_1=0.0853601$$

$$R_2=0.515327$$

$$R_3=4.76347$$

Energy: $E=-197.889176$ (-1.1% accuracy).

13. Aluminum atom - 13 electrons.

Electron configuration [Ne]$3s^23p^1$.

Electron shell configuration $\{2,8,3\}$.

Number of shells: 3

Energy function:

$$W=\frac{6}{\sqrt{R_1^2+R_3^2}}+\frac{24}{\sqrt{R_2^2+R_3^2}}-\frac{51}{2R_1}+\frac{7\sqrt{7}}{R_2}-\frac{104}{R_2}+\frac{\sqrt{3}}{R_3}-\frac{39}{R_3}+\frac{1}{R_1^2}+\frac{16}{R_2^2}+\frac{27}{2R_3^2}+\frac{16}{\sqrt{R_1^2+R_2^2}}$$

Radii of shells:

$$R_1=0.0786736$$

$$R_2=0.456415$$

$$R_3=3.41735$$

Energy: $E=-239.525918$ (-1.2% accuracy).

14. Silicon atom - 14 electrons.

Electron configuration [Ne]$3s^23p^2$.

Electron shell configuration $\{2,8,4\}$.

Number of shells: 3

Energy function:

$$W = \frac{8}{\sqrt{R_1^2+R_3^2}} + \frac{32}{\sqrt{R_2^2+R_3^2}} - \frac{55}{2R_1} + \frac{7\sqrt{7}}{R_2} - \frac{112}{R_2} + \frac{3\sqrt{\frac{3}{2}}}{R_3} - \frac{56}{R_3} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{18}{R_3^2} + \frac{16}{\sqrt{R_1^2+R_2^2}}$$

Radii of shells:

$$R_1 = 0.0729564$$

$$R_2 = 0.409724$$

$$R_3 = 2.68194$$

Energy: $E = -285.689213$ (-1.3% accuracy).

15. Phosphorus atom - 15 electrons.

Electron configuration [Ne]$3s^2 3p^3$.

Electron shell configuration $\{2, 8, 5\}$.

Number of shells: 3

Energy function:

$$W = \frac{10}{\sqrt{R_1^2+R_3^2}} + \frac{40}{\sqrt{R_2^2+R_3^2}} - \frac{59}{2R_1} + \frac{7\sqrt{7}}{R_2} - \frac{120}{R_2} + \frac{2\sqrt{10}}{R_3} - \frac{75}{R_3} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{45}{2R_3^2} + \frac{16}{\sqrt{R_1^2+R_2^2}}$$

Radii of shells:

$$R_1 = 0.0680122$$

$$R_2 = 0.371795$$

$$R_3 = 2.21417$$

Energy: $E = -336.522490$ (-1.4% accuracy).

16. Sulfur atom - 16 electrons.

Electron configuration [Ne]$3s^2 3p^4$.

Electron shell configuration $\{2, 8, 6\}$.

Number of shells: 3

Energy function:

$$W = \frac{12}{\sqrt{R_1^2+R_3^2}} + \frac{48}{\sqrt{R_2^2+R_3^2}} - \frac{63}{2R_1} + \frac{7\sqrt{7}}{R_2} - \frac{128}{R_2} + \frac{5\sqrt{15}}{2R_3} - \frac{96}{R_3} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{27}{R_3^2} + \frac{16}{\sqrt{R_1^2+R_2^2}}$$

Radii of shells:

$$R_1 = 0.0636943$$

$$R_2 = 0.340363$$

$$R_3 = 1.88919$$

Energy: $E = -392.167786$ (-1.5% accuracy).

17. Chlorine atom - 17 electrons.

Electron configuration [Ne]$3s^2 3p^5$.

Electron shell configuration $\{2, 8, 7\}$.

Number of shells: 3

Energy function:

$$W = \frac{14}{\sqrt{R_1^2 + R_3^2}} + \frac{56}{\sqrt{R_2^2 + R_3^2}} - \frac{67}{2R_1} + \frac{7\sqrt{7}}{R_2} - \frac{136}{R_2} + \frac{3\sqrt{21}}{R_3} - \frac{119}{R_3} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{63}{2R_3^2} + \frac{16}{\sqrt{R_1^2 + R_2^2}}$$

Radii of shells:

$$R_1 = 0.059891$$

$$R_2 = 0.31388$$

$$R_3 = 1.6497$$

Energy: $E = -452.766256$ (-1.6% accuracy).

18. Argon atom - 18 electrons.

Electron configuration [Ne]$3s^2 3p^6$.

Electron shell configuration $\{2, 8, 8\}$.

Number of shells: 3

Energy function:

$$W = \frac{16}{\sqrt{R_1^2 + R_3^2}} + \frac{64}{\sqrt{R_2^2 + R_3^2}} - \frac{71}{2R_1} + \frac{7\sqrt{7}}{R_2} - \frac{144}{R_2} + \frac{7\sqrt{7}}{R_3} - \frac{144}{R_3} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{36}{R_3^2} + \frac{16}{\sqrt{R_1^2 + R_2^2}}$$

Radii of shells:

$$R_1 = 0.0565155$$

$$R_2 = 0.291257$$

$$R_3 = 1.46556$$

Energy: $E = -518.458483$ (-1.7% accuracy).

19. Potassium atom - 19 electrons.

Electron configuration [Ar]$4s^1$.

Electron shell configuration $\{2,8,8,1\}$.

Number of shells: 4

Radii of shells:

$$R_1 = 0.0534996$$
$$R_2 = 0.271772$$
$$R_3 = 1.2449$$

Displacements of shells:

$$d_1 = -0.0000189968$$
$$d_2 = 0.000116251$$
$$d_3 = -0.00421529$$
$$d_4 = 14.6134$$

Energy: $E = -589.272676$ (-1.8% accuracy).

20. Calcium atom - 20 electrons.

Electron configuration [Ar]$4s^2$.

Electron shell configuration $\{2,8,8,2\}$.

Number of shells: 4

Energy function:

$$\begin{aligned} W \;=\; & \frac{16}{\sqrt{R_1^2+R_3^2}} + \frac{64}{\sqrt{R_2^2+R_3^2}} + \frac{4}{\sqrt{R_1^2+R_4^2}} + \frac{16}{\sqrt{R_2^2+R_4^2}} + \frac{16}{\sqrt{R_3^2+R_4^2}} - \frac{79}{2R_1} + \frac{7\sqrt{7}}{R_2} \\ & - \frac{160}{R_2} + \frac{7\sqrt{7}}{R_3} - \frac{160}{R_3} - \frac{79}{2R_4} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{36}{R_3^2} + \frac{16}{R_4^2} + \frac{16}{\sqrt{R_1^2+R_2^2}} \end{aligned}$$

Radii of shells:

$$R_1 = 0.0507888$$
$$R_2 = 0.254735$$
$$R_3 = 1.08339$$
$$R_4 = 8.11773$$

Energy: $E = -665.156401$ (-1.8% accuracy).

21. Scandium atom - 21 electrons.

Electron configuration [Ar]$3d^1 4s^2$.

Electron shell configuration $\{2, 8, 9, 2\}$.

Number of shells: 4

Energy function:

$$W = \frac{18}{\sqrt{R_1^2+R_3^2}} + \frac{72}{\sqrt{R_2^2+R_3^2}} + \frac{4}{\sqrt{R_1^2+R_4^2}} + \frac{16}{\sqrt{R_2^2+R_4^2}} + \frac{18}{\sqrt{R_3^2+R_4^2}} - \frac{83}{2R_1} + \frac{7\sqrt{7}}{R_2} - \frac{168}{R_2} - \frac{165}{R_3} - \frac{83}{2R_4} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{81}{2R_3^2} + \frac{16}{R_4^2} + \frac{16}{\sqrt{R_1^2+R_2^2}}$$

Radii of shells:

$$R_1 = 0.0483391$$
$$R_2 = 0.239695$$
$$R_3 = 1.00261$$
$$R_4 = 8.16164$$

Energy: $E = -746.974412$ (-1.8% accuracy).

22. Titanium atom - 22 electrons.

Electron configuration [Ar]$3d^2 4s^2$.

Electron shell configuration $\{2, 8, 10, 2\}$.

Number of shells: 4

Energy function:

$$W = \frac{20}{\sqrt{R_1^2+R_3^2}} + \frac{80}{\sqrt{R_2^2+R_3^2}} + \frac{4}{\sqrt{R_1^2+R_4^2}} + \frac{16}{\sqrt{R_2^2+R_4^2}} + \frac{20}{\sqrt{R_3^2+R_4^2}} - \frac{87}{2R_1} + \frac{7\sqrt{7}}{R_2} - \frac{176}{R_2} + \frac{27\sqrt{5}}{2R_3} - \frac{220}{R_3} - \frac{87}{2R_4} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{45}{R_3^2} + \frac{16}{R_4^2} + \frac{16}{\sqrt{R_1^2+R_2^2}}$$

Radii of shells:

$$R_1 = 0.0461145$$
$$R_2 = 0.226342$$
$$R_3 = 0.933328$$
$$R_4 = 8.20403$$

Energy: $E = -834.455189$ (-1.7% accuracy).

23. Vanadium atom - 23 electrons.

Electron configuration $[\mathrm{Ar}]3d^3 4s^2$.

Electron shell configuration $\{2, 8, 11, 2\}$.

Number of shells: 4

Energy function:

$$W = \frac{22}{\sqrt{R_1^2+R_3^2}} + \frac{88}{\sqrt{R_2^2+R_3^2}} + \frac{4}{\sqrt{R_1^2+R_4^2}} + \frac{16}{\sqrt{R_2^2+R_4^2}} + \frac{22}{\sqrt{R_3^2+R_4^2}} - \frac{91}{2R_1} + \frac{7\sqrt{7}}{R_2} - \frac{184}{R_2} + \frac{5\sqrt{55}}{R_3} - \frac{253}{R_3} - \frac{91}{2R_4} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{99}{2R_3^2} + \frac{16}{R_4^2} + \frac{16}{\sqrt{R_1^2+R_2^2}}$$

Radii of shells:

$$R_1 = 0.0440854$$

$$R_2 = 0.214406$$

$$R_3 = 0.873208$$

$$R_4 = 8.2443$$

Energy: $E = -927.738204$ (-1.7% accuracy).

24. Chromium atom - 24 electrons.

Electron configuration $[\mathrm{Ar}]3d^5 4s^1$.

Electron shell configuration $\{2, 8, 13, 1\}$.

Number of shells: 4

Radii of shells:

$$R_1 = 0.0422272$$

$$R_2 = 0.203627$$

$$R_3 = 0.851349$$

Displacements of shells:

$$d_1 = -8.127031044954481\text{`*^-6}$$

$$d_2 = 0.0000428536$$

$$d_3 = -0.000741952$$

$$d_4 = 15.0102$$

Energy: $E = -1027.43501$ (-1.6% accuracy).

25. Manganese atom - 25 electrons.

Electron configuration $[\mathrm{Ar}]3d^5 4s^2$.

Electron shell configuration $\{2, 8, 13, 2\}$.

Number of shells: 4

Energy function:

$$\begin{aligned} W \;=\;& \frac{26}{\sqrt{R_1^2+R_3^2}} + \frac{104}{\sqrt{R_2^2+R_3^2}} + \frac{4}{\sqrt{R_1^2+R_4^2}} + \frac{16}{\sqrt{R_2^2+R_4^2}} + \frac{26}{\sqrt{R_3^2+R_4^2}} - \frac{99}{2R_1} + \frac{7\sqrt{7}}{R_2} \\ &- \frac{200}{R_2} + \frac{6\sqrt{78}}{R_3} - \frac{325}{R_3} - \frac{99}{2R_4} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{117}{2R_3^2} + \frac{16}{R_4^2} + \frac{16}{\sqrt{R_1^2+R_2^2}} \end{aligned}$$

Radii of shells:

$$R_1 = 0.0405191$$
$$R_2 = 0.193965$$
$$R_3 = 0.773925$$
$$R_4 = 8.31772$$

Energy: $E = -1132.26861$ (-1.6% accuracy).

26. Iron atom - 26 electrons.

Electron configuration $[\mathrm{Ar}]3d^6 4s^2$.

Electron shell configuration $\{2, 8, 14, 2\}$.

Number of shells: 4

Energy function:

$$\begin{aligned} W \;=\;& \frac{28}{\sqrt{R_1^2+R_3^2}} + \frac{112}{\sqrt{R_2^2+R_3^2}} + \frac{4}{\sqrt{R_1^2+R_4^2}} + \frac{16}{\sqrt{R_2^2+R_4^2}} + \frac{28}{\sqrt{R_3^2+R_4^2}} - \frac{103}{2R_1} + \frac{7\sqrt{7}}{R_2} \\ &- \frac{208}{R_2} + \frac{13\sqrt{91}}{2R_3} - \frac{364}{R_3} - \frac{103}{2R_4} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{63}{R_3^2} + \frac{16}{R_4^2} + \frac{16}{\sqrt{R_1^2+R_2^2}} \end{aligned}$$

Radii of shells:

$$R_1 = 0.0389436$$
$$R_2 = 0.185146$$
$$R_3 = 0.732427$$
$$R_4 = 8.3509$$

Energy: $E = -1243.79477$ (-1.6% accuracy).

27. Cobalt atom - 27 electrons.

Electron configuration [Ar]$3d^7 4s^2$.

Electron shell configuration $\{2, 8, 15, 2\}$.

Number of shells: 4

Energy function:

$$W = \frac{30}{\sqrt{R_1^2+R_3^2}} + \frac{120}{\sqrt{R_2^2+R_3^2}} + \frac{4}{\sqrt{R_1^2+R_4^2}} + \frac{16}{\sqrt{R_2^2+R_4^2}} + \frac{30}{\sqrt{R_3^2+R_4^2}} - \frac{107}{2R_1} + \frac{7\sqrt{7}}{R_2} - \frac{216}{R_2} + \frac{7\sqrt{105}}{R_3} - \frac{405}{R_3} - \frac{107}{2R_4} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{135}{2R_3^2} + \frac{16}{R_4^2} + \frac{16}{\sqrt{R_1^2+R_2^2}}$$

Radii of shells:

$$R_1 = 0.037486$$

$$R_2 = 0.177096$$

$$R_3 = 0.695215$$

$$R_4 = 8.38187$$

Energy: $E = -1361.68071$ (-1.5% accuracy).

28. Nickel atom - 28 electrons.

Electron configuration [Ar]$3d^8 4s^2$.

Electron shell configuration $\{2, 8, 16, 2\}$.

Number of shells: 4

Energy function:

$$W = \frac{32}{\sqrt{R_1^2+R_3^2}} + \frac{128}{\sqrt{R_2^2+R_3^2}} + \frac{4}{\sqrt{R_1^2+R_4^2}} + \frac{16}{\sqrt{R_2^2+R_4^2}} + \frac{32}{\sqrt{R_3^2+R_4^2}} - \frac{111}{2R_1} + \frac{7\sqrt{7}}{R_2} - \frac{224}{R_2} + \frac{15\sqrt{30}}{R_3} - \frac{448}{R_3} - \frac{111}{2R_4} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{72}{R_3^2} + \frac{16}{R_4^2} + \frac{16}{\sqrt{R_1^2+R_2^2}}$$

Radii of shells:

$$R_1 = 0.0361335$$

$$R_2 = 0.16972$$

$$R_3 = 0.661652$$

$$R_4 = 8.41077$$

Energy: $E = -1486.06578$ (-1.5% accuracy).

29. Copper atom - 29 electrons.

Electron configuration [Ar]$3d^{10}4s^1$.

Electron shell configuration $\{2, 8, 18, 1\}$.

Number of shells: 4

Radii of shells:

$$R_1 = 0.034875$$
$$R_2 = 0.162898$$
$$R_3 = 0.648971$$

Displacements of shells:

$$d_1 = -4.316265977659996\text{*^-6}$$
$$d_2 = 0.0000207636$$
$$d_3 = -0.000225763$$
$$d_4 = 15.2259$$

Energy: $E = -1617.50705$ (-1.4% accuracy).

30. Zinc atom - 30 electrons.

Electron configuration [Ar]$3d^{10}4s^2$.

Electron shell configuration $\{2, 8, 18, 2\}$.

Number of shells: 4

Energy function:

$$W = \frac{36}{\sqrt{R_1^2+R_3^2}} + \frac{144}{\sqrt{R_2^2+R_3^2}} + \frac{4}{\sqrt{R_1^2+R_4^2}} + \frac{16}{\sqrt{R_2^2+R_4^2}} + \frac{36}{\sqrt{R_3^2+R_4^2}} - \frac{119}{2R_1} + \frac{7\sqrt{7}}{R_2} - \frac{240}{R_2} + \frac{51\sqrt{17}}{2R_3} - \frac{540}{R_3} - \frac{119}{2R_4} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{81}{R_3^2} + \frac{16}{R_4^2} + \frac{16}{\sqrt{R_1^2+R_2^2}}$$

Radii of shells:

$$R_1 = 0.0337013$$
$$R_2 = 0.156675$$
$$R_3 = 0.603494$$
$$R_4 = 8.46297$$

Energy: $E = -1754.89059$ (-1.4% accuracy).

31. Gallium atom - 31 electrons.

Electron configuration $[\mathrm{Ar}]3d^{10}4s^24p^1$.

Electron shell configuration $\{2, 8, 18, 3\}$.

Number of shells: 4

Energy function:

$$\begin{aligned} W \;=\; & \frac{36}{\sqrt{R_1^2+R_3^2}} + \frac{144}{\sqrt{R_2^2+R_3^2}} + \frac{6}{\sqrt{R_1^2+R_4^2}} + \frac{24}{\sqrt{R_2^2+R_4^2}} + \frac{54}{\sqrt{R_3^2+R_4^2}} - \frac{123}{2R_1} + \frac{7\sqrt{7}}{R_2} \\ & - \frac{248}{R_2} + \frac{51\sqrt{17}}{2R_3} - \frac{558}{R_3} + \frac{\sqrt{3}}{R_4} - \frac{93}{R_4} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{81}{R_3^2} + \frac{24}{R_4^2} + \frac{16}{\sqrt{R_1^2+R_2^2}} \end{aligned}$$

Radii of shells:

$$R_1 = 0.0326039$$
$$R_2 = 0.150906$$
$$R_3 = 0.564111$$
$$R_4 = 6.00079$$

Energy: $E = -1898.52671$ (-1.3% accuracy).

32. Germanium atom - 32 electrons.

Electron configuration $[\mathrm{Ar}]3d^{10}4s^24p^2$.

Electron shell configuration $\{2, 8, 18, 4\}$.

Number of shells: 4

Energy function:

$$\begin{aligned} W \;=\; & \frac{36}{\sqrt{R_1^2+R_3^2}} + \frac{144}{\sqrt{R_2^2+R_3^2}} + \frac{8}{\sqrt{R_1^2+R_4^2}} + \frac{32}{\sqrt{R_2^2+R_4^2}} + \frac{72}{\sqrt{R_3^2+R_4^2}} - \frac{127}{2R_1} + \frac{7\sqrt{7}}{R_2} \\ & - \frac{256}{R_2} + \frac{51\sqrt{17}}{2R_3} - \frac{576}{R_3} + \frac{3\sqrt{\frac{3}{2}}}{R_4} - \frac{128}{R_4} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{81}{R_3^2} + \frac{32}{R_4^2} + \frac{16}{\sqrt{R_1^2+R_2^2}} \end{aligned}$$

Radii of shells:

$$R_1 = 0.0315757$$
$$R_2 = 0.145542$$
$$R_3 = 0.529686$$
$$R_4 = 4.65475$$

Energy: $E = -2048.50051$ (-1.4% accuracy).

33. Arsenic atom - 33 electrons.

Electron configuration $[\mathrm{Ar}]3d^{10}4s^2 4p^3$.

Electron shell configuration $\{2, 8, 18, 5\}$.

Number of shells: 4

Energy function:

$$\begin{aligned} W \;=\; & \frac{36}{\sqrt{R_1^2+R_3^2}}+\frac{144}{\sqrt{R_2^2+R_3^2}}+\frac{10}{\sqrt{R_1^2+R_4^2}}+\frac{40}{\sqrt{R_2^2+R_4^2}}+\frac{90}{\sqrt{R_3^2+R_4^2}}-\frac{131}{2R_1}+\frac{7\sqrt{7}}{R_2} \\ & -\frac{264}{R_2}+\frac{51\sqrt{17}}{2R_3}-\frac{594}{R_3}+\frac{2\sqrt{10}}{R_4}-\frac{165}{R_4}+\frac{1}{R_1^2}+\frac{16}{R_2^2}+\frac{81}{R_3^2}+\frac{40}{R_4^2}+\frac{16}{\sqrt{R_1^2+R_2^2}} \end{aligned}$$

Radii of shells:

$$R_1 = 0.0306103$$
$$R_2 = 0.140543$$
$$R_3 = 0.499346$$
$$R_4 = 3.80288$$

Energy: $E = -2204.89644$ (-1.4% accuracy).

34. Selenium atom - 34 electrons.

Electron configuration $[\mathrm{Ar}]3d^{10}4s^2 4p^4$.

Electron shell configuration $\{2, 8, 18, 6\}$.

Number of shells: 4

Energy function:

$$\begin{aligned} W \;=\; & \frac{36}{\sqrt{R_1^2+R_3^2}}+\frac{144}{\sqrt{R_2^2+R_3^2}}+\frac{12}{\sqrt{R_1^2+R_4^2}}+\frac{48}{\sqrt{R_2^2+R_4^2}}+\frac{108}{\sqrt{R_3^2+R_4^2}}-\frac{135}{2R_1}+\frac{7\sqrt{7}}{R_2} \\ & -\frac{272}{R_2}+\frac{51\sqrt{17}}{2R_3}-\frac{612}{R_3}+\frac{5\sqrt{15}}{2R_4}-\frac{204}{R_4}+\frac{1}{R_1^2}+\frac{16}{R_2^2}+\frac{81}{R_3^2}+\frac{48}{R_4^2}+\frac{16}{\sqrt{R_1^2+R_2^2}} \end{aligned}$$

Radii of shells:

$$R_1 = 0.0297021$$
$$R_2 = 0.135871$$
$$R_3 = 0.472406$$
$$R_4 = 3.21598$$

Energy: $E = -2367.79839$ (-1.4% accuracy).

35. Bromine atom - 35 electrons.

Electron configuration [Ar]$3d^{10}4s^2 4p^5$.

Electron shell configuration $\{2, 8, 18, 7\}$.

Number of shells: 4

Energy function:

$$\begin{aligned} W \;=\; & \frac{36}{\sqrt{R_1^2+R_3^2}} + \frac{144}{\sqrt{R_2^2+R_3^2}} + \frac{14}{\sqrt{R_1^2+R_4^2}} + \frac{56}{\sqrt{R_2^2+R_4^2}} + \frac{126}{\sqrt{R_3^2+R_4^2}} - \frac{139}{2R_1} + \frac{7\sqrt{7}}{R_2} \\ & - \frac{280}{R_2} + \frac{51\sqrt{17}}{2R_3} - \frac{630}{R_3} + \frac{3\sqrt{21}}{R_4} - \frac{245}{R_4} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{81}{R_3^2} + \frac{56}{R_4^2} + \frac{16}{\sqrt{R_1^2+R_2^2}} \end{aligned}$$

Radii of shells:

$$R_1 = 0.0288463$$
$$R_2 = 0.131496$$
$$R_3 = 0.448324$$
$$R_4 = 2.78777$$

Energy: $E = -2537.28955$ (-1.4% accuracy).

36. Krypton atom - 36 electrons.

Electron configuration [Ar]$3d^{10}4s^2 4p^6$.

Electron shell configuration $\{2, 8, 18, 8\}$.

Number of shells: 4

Energy function:

$$\begin{aligned} W \;=\; & \frac{36}{\sqrt{R_1^2+R_3^2}} + \frac{144}{\sqrt{R_2^2+R_3^2}} + \frac{16}{\sqrt{R_1^2+R_4^2}} + \frac{64}{\sqrt{R_2^2+R_4^2}} + \frac{144}{\sqrt{R_3^2+R_4^2}} - \frac{143}{2R_1} + \frac{7\sqrt{7}}{R_2} \\ & - \frac{288}{R_2} + \frac{51\sqrt{17}}{2R_3} - \frac{648}{R_3} + \frac{7\sqrt{7}}{R_4} - \frac{288}{R_4} + \frac{1}{R_1^2} + \frac{16}{R_2^2} + \frac{81}{R_3^2} + \frac{64}{R_4^2} + \frac{16}{\sqrt{R_1^2+R_2^2}} \end{aligned}$$

Radii of shells:

$$R_1 = 0.0280383$$
$$R_2 = 0.127391$$
$$R_3 = 0.426666$$
$$R_4 = 2.46196$$

Energy: $E = -2713.45234$ (-1.5% accuracy).

37. Rubidium atom - 37 electrons.

Electron configuration [Kr]$5s^1$.

Electron shell configuration $\{2, 8, 18, 8, 1\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0272744$$

$$R_2 = 0.123531$$

$$R_3 = 0.40715$$

$$R_4 = 2.07216$$

Displacements of shells:

$d_1 = -2.34433854663308$*^-6

$$d_2 = 0.0000105172$$

$$d_3 = -0.0000675234$$

$$d_4 = 0.00802134$$

$$d_5 = -22.3925$$

Energy: $E = -2896.33802$ (-1.5% accuracy).

38. Strontium atom - 38 electrons.

Electron configuration [Kr]$5s^2$.

Electron shell configuration $\{2, 8, 18, 8, 2\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0265509$$

$$R_2 = 0.119895$$

$$R_3 = 0.389406$$

$$R_4 = 1.78975$$

$$R_5 = 12.3564$$

Energy: $E = -3085.90685$ (-1.5% accuracy).

39. Yttrium atom - 39 electrons.

Electron configuration [Kr]$4d^1 5s^2$.

Electron shell configuration $\{2, 8, 18, 9, 2\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0258649$$
$$R_2 = 0.116465$$
$$R_3 = 0.373163$$
$$R_4 = 1.6524$$
$$R_5 = 12.4505$$

Energy: $E = -3282.59502$ (-1.5% accuracy).

40. Zirconium atom - 40 electrons.

Electron configuration [Kr]$4d^2 5s^2$.

Electron shell configuration $\{2, 8, 18, 10, 2\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0252133$$
$$R_2 = 0.113223$$
$$R_3 = 0.358267$$
$$R_4 = 1.53568$$
$$R_5 = 12.5384$$

Energy: $E = -3486.28577$ (-1.5% accuracy).

41. Niobium atom - 41 electrons.

Electron configuration [Kr]$4d^4 5s^1$.

Electron shell configuration $\{2, 8, 18, 12, 1\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0245938$$
$$R_2 = 0.110155$$
$$R_3 = 0.344484$$
$$R_4 = 1.49809$$

Displacements of shells:

$$d_1 = -1.5033858095194916\text{*^-6}$$
$$d_2 = 6.573632143898776\text{*^-6}$$
$$d_3 = -0.0000365711$$
$$d_4 = 0.00183582$$
$$d_5 = -23.0707$$

Energy: $E = -3697.24936$ (-1.5% accuracy).

42. Molybdenum atom - 42 electrons.

Electron configuration [Kr]$4d^5 5s^1$.

Electron shell configuration $\{2, 8, 18, 13, 1\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0240039$$
$$R_2 = 0.107247$$
$$R_3 = 0.331812$$
$$R_4 = 1.40283$$

Displacements of shells:

$$d_1 = -1.3711462655608077\text{*^-6}$$
$$d_2 = 5.960904049253322\text{*^-6}$$
$$d_3 = -0.0000322038$$
$$d_4 = 0.00137308$$
$$d_5 = -23.1838$$

Energy: $E = -3915.17342$ (-1.6% accuracy).

43. Technetium atom - 43 electrons.

Electron configuration $[\mathrm{Kr}]4d^5 5s^2$.

Electron shell configuration $\{2, 8, 18, 13, 2\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0234417$$
$$R_2 = 0.104487$$
$$R_3 = 0.320145$$
$$R_4 = 1.27082$$
$$R_5 = 12.7633$$

Energy: $E = -4140.16816$ (-1.6% accuracy).

44. Ruthenium atom - 44 electrons.

Electron configuration $[\mathrm{Kr}]4d^7 5s^1$.

Electron shell configuration $\{2, 8, 18, 15, 1\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0229052$$
$$R_2 = 0.101865$$
$$R_3 = 0.309154$$
$$R_4 = 1.24597$$

Displacements of shells:

$$d_1 = -1.1571278929287368\text{*^-6}$$
$$d_2 = 4.976034428496173\text{*^-6}$$
$$d_3 = -0.0000255012$$
$$d_4 = 0.000817318$$
$$d_5 = -23.3715$$

Energy: $E = -4372.81265$ (-1.6% accuracy).

45. Rhodium atom - 45 electrons.

Electron configuration [Kr]$4d^8 5s^1$.

Electron shell configuration $\{2, 8, 18, 16, 1\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0223927$$
$$R_2 = 0.099369$$
$$R_3 = 0.298979$$
$$R_4 = 1.18056$$

Displacements of shells:

$$d_1 = -1.0693029889991805\text{*^-6}$$
$$d_2 = 4.574798593382201\text{*^-6}$$
$$d_3 = -0.0000228929$$
$$d_4 = 0.000646903$$
$$d_5 = -23.4503$$

Energy: $E = -4612.68588$ (-1.6% accuracy).

46. Palladium atom - 46 electrons.

Electron configuration [Kr]$4d^{10}$.

Electron shell configuration $\{2, 8, 18, 18\}$.

Number of shells: 4

Radii of shells:

$$R_1 = 0.0219026$$
$$R_2 = 0.0969918$$
$$R_3 = 0.28938$$
$$R_4 = 1.15908$$

Energy: $E = -4859.77038$ (-1.6% accuracy).

47. Silver atom - 47 electrons.

Electron configuration [Kr]$4d^{10} 5s^1$.

Electron shell configuration $\{2, 8, 18, 18, 1\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0214335$$
$$R_2 = 0.0947244$$
$$R_3 = 0.280567$$
$$R_4 = 1.06921$$

Displacements of shells:

$$d_1 = -9.218975823568861\text{*^-7}$$
$$d_2 = 3.90600500135885\text{*^-6}$$
$$d_3 = -0.0000187168$$
$$d_4 = 0.000422234$$
$$d_5 = -23.5854$$

Energy: $E = -5114.93386$ (-1.6% accuracy).

48. Cadmium atom - 48 electrons.

Electron configuration $[\mathrm{Kr}]4d^{10}5s^2$.

Electron shell configuration $\{2, 8, 18, 18, 2\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0209841$$
$$R_2 = 0.0925598$$
$$R_3 = 0.272284$$
$$R_4 = 0.992647$$
$$R_5 = 13.0356$$

Energy: $E = -5377.41421$ (-1.6% accuracy).

49. Indium atom - 49 electrons.

Electron configuration $[\mathrm{Kr}]4d^{10}5s^2 5p^1$.

Electron shell configuration $\{2, 8, 18, 18, 3\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0205531$$
$$R_2 = 0.0904913$$
$$R_3 = 0.264482$$
$$R_4 = 0.926719$$
$$R_5 = 9.20323$$

Energy: $E = -5647.25544$ (-1.7% accuracy).

50. Tin atom - 50 electrons.

Electron configuration [Kr]$4d^{10}5s^2 5p^2$.

Electron shell configuration $\{2, 8, 18, 18, 4\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0201394$$
$$R_2 = 0.0885126$$
$$R_3 = 0.257117$$
$$R_4 = 0.869401$$
$$R_5 = 7.11349$$

Energy: $E = -5924.50887$ (-1.7% accuracy).

51. Antimony atom - 51 electrons.

Electron configuration [Kr]$4d^{10}5s^2 5p^3$.

Electron shell configuration $\{2, 8, 18, 18, 5\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0197421$$
$$R_2 = 0.086618$$
$$R_3 = 0.250151$$
$$R_4 = 0.819143$$
$$R_5 = 5.79455$$

Energy: $E = -6209.22562$ (-1.7% accuracy).

52. Tellurium atom - 52 electrons.

Electron configuration [Kr]$4d^{10}5s^{2}5p^{4}$.

Electron shell configuration $\{2, 8, 18, 18, 6\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0193601$$
$$R_2 = 0.0848024$$
$$R_3 = 0.243551$$
$$R_4 = 0.77473$$
$$R_5 = 4.88833$$

Energy: $E = -6501.45674$ (-1.7% accuracy).

53. Iodine atom - 53 electrons.

Electron configuration [Kr]$4d^{10}5s^{2}5p^{5}$.

Electron shell configuration $\{2, 8, 18, 18, 7\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0189927$$
$$R_2 = 0.0830608$$
$$R_3 = 0.237288$$
$$R_4 = 0.735204$$
$$R_5 = 4.22892$$

Energy: $E = -6801.25303$ (-1.7% accuracy).

54. Xenon atom - 54 electrons.

Electron configuration [Kr]$4d^{10}5s^{2}5p^{6}$.

Electron shell configuration $\{2, 8, 18, 18, 8\}$.

Number of shells: 5

Radii of shells:

$$R_1 = 0.0186389$$
$$R_2 = 0.0813889$$
$$R_3 = 0.231336$$
$$R_4 = 0.699799$$
$$R_5 = 3.7285$$

Energy: $E = -7108.66503$ (-1.7% accuracy).

55. Cesium atom - 55 electrons.

Electron configuration [Xe]$6s^1$.

Electron shell configuration $\{2, 8, 18, 18, 8, 1\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.018298$$
$$R_2 = 0.0797825$$
$$R_3 = 0.225671$$
$$R_4 = 0.668072$$
$$R_5 = 3.12563$$

Displacements of shells:

$$d_1 = 7.895894877871593\text{*^-7}$$
$$d_2 = -3.242220325224433\text{*^-6}$$
$$d_3 = 0.0000140942$$
$$d_4 = -0.000156623$$
$$d_5 = 0.0139525$$
$$d_6 = -31.7102$$

Energy: $E = -7423.73630$ (-1.8% accuracy).

56. Barium atom - 56 electrons.

Electron configuration [Xe]$6s^2$.

Electron shell configuration $\{2, 8, 18, 18, 8, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0179694$$
$$R_2 = 0.078238$$
$$R_3 = 0.220275$$
$$R_4 = 0.639324$$
$$R_5 = 2.69084$$
$$R_6 = 17.3924$$

Energy: $E = -7746.43576$ (-1.8% accuracy).

57. Lanthanum atom - 57 electrons.

Electron configuration [Xe]$5d^1 6s^2$.

Electron shell configuration $\{2, 8, 18, 18, 9, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0176524$$
$$R_2 = 0.0767518$$
$$R_3 = 0.215128$$
$$R_4 = 0.613038$$
$$R_5 = 2.4828$$
$$R_6 = 17.5562$$

Energy: $E = -8077.01727$ (-1.8% accuracy).

58. Cerium atom - 58 electrons.

Electron configuration [Xe]$4f^1 5d^1 6s^2$.

Electron shell configuration $\{2, 8, 18, 19, 9, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0173463$$
$$R_2 = 0.0753206$$
$$R_3 = 0.210257$$
$$R_4 = 0.597695$$
$$R_5 = 2.48234$$
$$R_6 = 17.5583$$

Energy: $E = -8419.80157$ (-1.7% accuracy).

59. Praseodymium atom - 59 electrons.

Electron configuration $[\text{Xe}]4f^3 6s^2$.

Electron shell configuration $\{2, 8, 18, 21, 8, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0170507$$
$$R_2 = 0.0739413$$
$$R_3 = 0.205634$$
$$R_4 = 0.591818$$
$$R_5 = 2.69547$$
$$R_6 = 17.3882$$

Energy: $E = -8775.24841$ (-1.7% accuracy).

60. Neodymium atom - 60 electrons.

Electron configuration $[\text{Xe}]4f^4 6s^2$.

Electron shell configuration $\{2, 8, 18, 22, 8, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.016765$$
$$R_2 = 0.0726115$$
$$R_3 = 0.201182$$
$$R_4 = 0.577575$$
$$R_5 = 2.69816$$
$$R_6 = 17.3846$$

Energy: $E = -9135.27406$ (-1.6% accuracy).

61. Promethium atom - 61 electrons.

Electron configuration $[\mathrm{Xe}]4f^5 6s^2$.

Electron shell configuration $\{2, 8, 18, 23, 8, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0164887$$
$$R_2 = 0.0713284$$
$$R_3 = 0.196921$$
$$R_4 = 0.564025$$
$$R_5 = 2.70129$$
$$R_6 = 17.3802$$

Energy: $E = -9503.97454$ (-1.6% accuracy).

62. Samarium atom - 62 electrons.

Electron configuration $[\mathrm{Xe}]4f^6 6s^2$.

Electron shell configuration $\{2, 8, 18, 24, 8, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0162214$$
$$R_2 = 0.0700897$$
$$R_3 = 0.192839$$
$$R_4 = 0.551119$$
$$R_5 = 2.7048$$
$$R_6 = 17.3751$$

Energy: $E = -9881.42826$ (-1.6% accuracy).

63. Europium atom - 63 electrons.

Electron configuration [Xe]$4f^7 6s^2$.

Electron shell configuration $\{2, 8, 18, 25, 8, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0159626$$
$$R_2 = 0.0688931$$
$$R_3 = 0.188925$$
$$R_4 = 0.538808$$
$$R_5 = 2.70861$$
$$R_6 = 17.3693$$

Energy: $E = -10267.7137$ (-1.5% accuracy).

64. Gadolinium atom - 64 electrons.

Electron configuration [Xe]$4f^7 5d^1 6s^2$.

Electron shell configuration $\{2, 8, 18, 25, 9, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0157119$$
$$R_2 = 0.0677367$$
$$R_3 = 0.185156$$
$$R_4 = 0.520142$$
$$R_5 = 2.49136$$
$$R_6 = 17.548$$

Energy: $E = -10658.1678$ (-1.5% accuracy).

65. Terbium atom - 65 electrons.

Electron configuration [Xe]$4f^9 6s^2$.

Electron shell configuration $\{2, 8, 18, 27, 8, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0154689$$
$$R_2 = 0.0666179$$
$$R_3 = 0.181559$$
$$R_4 = 0.515812$$
$$R_5 = 2.71699$$
$$R_6 = 17.3563$$

Energy: $E = -11067.0931$ (-1.4% accuracy).

66. Dysprosium atom - 66 electrons.

Electron configuration [Xe]$4f^{10} 6s^2$.

Electron shell configuration $\{2, 8, 18, 28, 8, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0152334$$
$$R_2 = 0.0655355$$
$$R_3 = 0.178089$$
$$R_4 = 0.505055$$
$$R_5 = 2.72147$$
$$R_6 = 17.3492$$

Energy: $E = -11480.3439$ (-1.4% accuracy).

67. Holmium atom - 67 electrons.

Electron configuration $[\mathrm{Xe}]4f^{11}6s^2$.

Electron shell configuration $\{2, 8, 18, 29, 8, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0150049$$
$$R_2 = 0.0644876$$
$$R_3 = 0.174751$$
$$R_4 = 0.494748$$
$$R_5 = 2.7261$$
$$R_6 = 17.3418$$

Energy: $E = -11902.7399$ (-1.4% accuracy).

68. Erbium atom - 68 electrons.

Electron configuration $[\mathrm{Xe}]4f^{12}6s^2$.

Electron shell configuration $\{2, 8, 18, 30, 8, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0147832$$
$$R_2 = 0.0634725$$
$$R_3 = 0.171537$$
$$R_4 = 0.484864$$
$$R_5 = 2.73084$$
$$R_6 = 17.3341$$

Energy: $E = -12334.3595$ (-1.3% accuracy).

69. Thulium atom - 69 electrons.

Electron configuration [Xe]$4f^{13}6s^2$.

Electron shell configuration $\{2, 8, 18, 31, 8, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0145679$$
$$R_2 = 0.0624888$$
$$R_3 = 0.168441$$
$$R_4 = 0.475376$$
$$R_5 = 2.73568$$
$$R_6 = 17.3261$$

Energy: $E = -12775.2811$ (-1.3% accuracy).

70. Ytterbium atom - 70 electrons.

Electron configuration [Xe]$4f^{14}6s^2$.

Electron shell configuration $\{2, 8, 18, 32, 8, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0143588$$
$$R_2 = 0.061535$$
$$R_3 = 0.165454$$
$$R_4 = 0.46626$$
$$R_5 = 2.74058$$
$$R_6 = 17.318$$

Energy: $E = -13225.5830$ (-1.3% accuracy).

71. Lutetium atom - 71 electrons.

Electron configuration $[\mathrm{Xe}]4f^{14}5d^1 6s^2$.

Electron shell configuration $\{2, 8, 18, 32, 9, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0141557$$
$$R_2 = 0.06061$$
$$R_3 = 0.162574$$
$$R_4 = 0.452292$$
$$R_5 = 2.51557$$
$$R_6 = 17.5086$$

Energy: $E = -13679.8540$ (-1.3% accuracy).

72. Hafnium atom - 72 electrons.

Electron configuration $[\mathrm{Xe}]4f^{14}5d^2 6s^2$.

Electron shell configuration $\{2, 8, 18, 32, 10, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0139581$$
$$R_2 = 0.0597123$$
$$R_3 = 0.15979$$
$$R_4 = 0.439193$$
$$R_5 = 2.32549$$
$$R_6 = 17.683$$

Energy: $E = -14142.8430$ (-1.3% accuracy).

73. Tantalum atom - 73 electrons.

Electron configuration [Xe]$4f^{14}5d^3 6s^2$.

Electron shell configuration $\{2, 8, 18, 32, 11, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0137661$$
$$R_2 = 0.0588407$$
$$R_3 = 0.157097$$
$$R_4 = 0.426885$$
$$R_5 = 2.16286$$
$$R_6 = 17.8413$$

Energy: $E = -14614.6028$ (-1.3% accuracy).

74. Tungsten atom - 74 electrons.

Electron configuration [Xe]$4f^{14}5d^4 6s^2$.

Electron shell configuration $\{2, 8, 18, 32, 12, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0135792$$
$$R_2 = 0.057994$$
$$R_3 = 0.154491$$
$$R_4 = 0.415296$$
$$R_5 = 2.02218$$
$$R_6 = 17.9845$$

Energy: $E = -15095.1861$ (-1.3% accuracy).

75. Rhenium atom - 75 electrons.

Electron configuration $[\mathrm{Xe}]4f^{14}5d^5 6s^2$.

Electron shell configuration $\{2, 8, 18, 32, 13, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0133973$$
$$R_2 = 0.0571713$$
$$R_3 = 0.151968$$
$$R_4 = 0.404364$$
$$R_5 = 1.89932$$
$$R_6 = 18.1141$$

Energy: $E = -15584.6452$ (-1.3% accuracy).

76. Osmium atom - 76 electrons.

Electron configuration $[\mathrm{Xe}]4f^{14}5d^6 6s^2$.

Electron shell configuration $\{2, 8, 18, 32, 14, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0132203$$

$$R_2 = 0.0563716$$

$$R_3 = 0.149524$$

$$R_4 = 0.394034$$

$$R_5 = 1.79112$$

$$R_6 = 18.2314$$

Energy: $E = -16083.0322$ (-1.3% accuracy).

77. Iridium atom - 77 electrons.

Electron configuration $[\mathrm{Xe}]4f^{14}5d^{7}6s^{2}$.

Electron shell configuration $\{2, 8, 18, 32, 15, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0130479$$

$$R_2 = 0.0555938$$

$$R_3 = 0.147156$$

$$R_4 = 0.384255$$

$$R_5 = 1.69512$$

$$R_6 = 18.338$$

Energy: $E = -16590.3989$ (-1.3% accuracy).

78. Platinum atom - 78 electrons.

Electron configuration $[\mathrm{Xe}]4f^{14}5d^{9}6s^{1}$.

Electron shell configuration $\{2, 8, 18, 32, 17, 1\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0128799$$
$$R_2 = 0.054837$$
$$R_3 = 0.14486$$
$$R_4 = 0.374913$$
$$R_5 = 1.66489$$

Displacements of shells:

$$d_1 = 2.1812497073659017\text{*^-7}$$
$$d_2 = -8.441623123621652\text{*^-7}$$
$$d_3 = 3.0485179745092073\text{*^-6}$$
$$d_4 = -0.000012599$$
$$d_5 = 0.000798811$$
$$d_6 = -33.6621$$

Energy: $E = -17106.7872$ (-1.3% accuracy).

79. Gold atom - 79 electrons.

Electron configuration [Xe]$4f^{14}5d^{10}6s^1$.

Electron shell configuration $\{2, 8, 18, 32, 18, 1\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0127161$$
$$R_2 = 0.0541006$$
$$R_3 = 0.142632$$
$$R_4 = 0.366106$$
$$R_5 = 1.58255$$

Displacements of shells:

$$d_1 = 2.081514377202987\text{*^-7}$$
$$d_2 = -8.041504450807404\text{*^-7}$$
$$d_3 = 2.8923755940777566\text{*^-6}$$
$$d_4 = -0.0000116881$$
$$d_5 = 0.000644345$$
$$d_6 = -33.7731$$

Energy: $E = -17632.2391$ (-1.3% accuracy).

80. Mercury atom - 80 electrons.

Electron configuration $[\mathrm{Xe}]4f^{14}5d^{10}6s^2$.

Electron shell configuration $\{2, 8, 18, 32, 18, 2\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0125565$$
$$R_2 = 0.0533835$$
$$R_3 = 0.140469$$
$$R_4 = 0.357806$$
$$R_5 = 1.46268$$
$$R_6 = 18.6048$$

Energy: $E = -18166.8929$ (-1.3% accuracy).

81. Thallium atom - 81 electrons.

Electron configuration $[\mathrm{Xe}]4f^{14}5d^{10}6s^2 6p^1$.

Electron shell configuration $\{2, 8, 18, 32, 18, 3\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0124009$$
$$R_2 = 0.0526852$$
$$R_3 = 0.13837$$
$$R_4 = 0.349901$$
$$R_5 = 1.35992$$
$$R_6 = 13.1057$$

Energy: $E = -18710.5305$ (-1.3% accuracy).

82. Lead atom - 82 electrons.

Electron configuration $[\mathrm{Xe}]4f^{14}5d^{10}6s^2 6p^2$.

Electron shell configuration $\{2, 8, 18, 32, 18, 4\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.012249$$

$$R_2 = 0.0520048$$

$$R_3 = 0.136332$$

$$R_4 = 0.342359$$

$$R_5 = 1.27103$$

$$R_6 = 10.1128$$

Energy: $E = -19263.1863$ (-1.4% accuracy).

83. Bismuth atom - 83 electrons.

Electron configuration $[\mathrm{Xe}]4f^{14}5d^{10}6s^2 6p^3$.

Electron shell configuration $\{2, 8, 18, 32, 18, 5\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0121008$$

$$R_2 = 0.0513417$$

$$R_3 = 0.134351$$

$$R_4 = 0.335153$$

$$R_5 = 1.19349$$

$$R_6 = 8.22687$$

Energy: $E = -19824.8943$ (-1.4% accuracy).

84. Polonium atom - 84 electrons.

Electron configuration $[\mathrm{Xe}]4f^{14}5d^{10}6s^2 6p^4$.

Electron shell configuration $\{2, 8, 18, 32, 18, 6\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0119562$$
$$R_2 = 0.0506952$$
$$R_3 = 0.132426$$
$$R_4 = 0.328258$$
$$R_5 = 1.12534$$
$$R_6 = 6.93276$$

Energy: $E = -20395.6880$ (-1.4% accuracy).

85. Astatine atom - 85 electrons.

Electron configuration $[\mathrm{Xe}]4f^{14}5d^{10}6s^26p^5$.

Electron shell configuration $\{2, 8, 18, 32, 18, 7\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.011815$$
$$R_2 = 0.0500647$$
$$R_3 = 0.130555$$
$$R_4 = 0.321652$$
$$R_5 = 1.06502$$
$$R_6 = 5.992$$

Energy: $E = -20975.6003$ (-1.4% accuracy).

86. Radon atom - 86 electrons.

Electron configuration $[\mathrm{Xe}]4f^{14}5d^{10}6s^26p^6$.

Electron shell configuration $\{2, 8, 18, 32, 18, 8\}$.

Number of shells: 6

Radii of shells:

$$R_1 = 0.0116771$$
$$R_2 = 0.0494497$$
$$R_3 = 0.128735$$
$$R_4 = 0.315316$$
$$R_5 = 1.0113$$
$$R_6 = 5.27856$$

Energy: $E = -21564.6638$ (-1.4% accuracy).

87. Francium atom - 87 electrons.

Electron configuration [Rn]$7s^1$.

Electron shell configuration $\{2, 8, 18, 32, 18, 8, 1\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0115423$$
$$R_2 = 0.0488495$$
$$R_3 = 0.126964$$
$$R_4 = 0.309229$$
$$R_5 = 0.963472$$
$$R_6 = 4.41418$$

Displacements of shells:

$$d_1 = 2.4157209971377333\text{*^-7}$$
$$d_2 = -9.215868322586316\text{*^-7}$$
$$d_3 = 3.2234854412427395\text{*^-6}$$
$$d_4 = -0.0000116453$$
$$d_5 = 0.000252419$$
$$d_6 = -0.0218662$$
$$d_7 = 42.5387$$

Energy: $E = -22162.9119$ (-1.4% accuracy).

88. Radium atom - 88 electrons.

Electron configuration [Rn]$7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 18, 8, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0114107$$
$$R_2 = 0.0482637$$
$$R_3 = 0.125241$$
$$R_4 = 0.303379$$
$$R_5 = 0.920377$$
$$R_6 = 3.79193$$
$$R_7 = 23.2069$$

Energy: $E = -22770.3198$ (-1.4% accuracy).

89. Actinium atom - 89 electrons.

Electron configuration [Rn]$6d^1 7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 18, 9, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.011282$$
$$R_2 = 0.0476917$$
$$R_3 = 0.123563$$
$$R_4 = 0.297751$$
$$R_5 = 0.881147$$
$$R_6 = 3.4966$$
$$R_7 = 23.4654$$

Energy: $E = -23387.0491$ (-1.4% accuracy).

90. Thorium atom - 90 electrons.

Electron configuration [Rn]$6d^2 7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 18, 10, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0111561$$
$$R_2 = 0.0471331$$
$$R_3 = 0.121929$$
$$R_4 = 0.292331$$
$$R_5 = 0.845442$$
$$R_6 = 3.24625$$
$$R_7 = 23.7029$$

Energy: $E = -24013.0627$ (-1.4% accuracy).

91. Protactinium atom - 91 electrons.

Electron configuration [Rn]$5f^2 6d^1 7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 20, 9, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0110331$$
$$R_2 = 0.0465873$$
$$R_3 = 0.120335$$
$$R_4 = 0.287177$$
$$R_5 = 0.838179$$
$$R_6 = 3.49968$$
$$R_7 = 23.4633$$

Energy: $E = -24653.9628$ (-1.4% accuracy).

92. Uranium atom - 92 electrons.

Electron configuration [Rn]$5f^3 6d^1 7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 21, 9, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0109127$$

$$R_2 = 0.046054$$

$$R_3 = 0.118783$$

$$R_4 = 0.28218$$

$$R_5 = 0.818381$$

$$R_6 = 3.50244$$

$$R_7 = 23.4596$$

Energy: $E = -25302.0354$ (-1.4% accuracy).

93. Neptunium atom - 93 electrons.

Electron configuration $[\mathrm{Rn}]5f^4 6d^1 7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 22, 9, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0107949$$

$$R_2 = 0.0455327$$

$$R_3 = 0.11727$$

$$R_4 = 0.277362$$

$$R_5 = 0.799583$$

$$R_6 = 3.50587$$

$$R_7 = 23.4546$$

Energy: $E = -25959.9189$ (-1.4% accuracy).

94. Plutonium atom - 94 electrons.

Electron configuration $[\mathrm{Rn}]5f^6 7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 24, 8, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0106797$$
$$R_2 = 0.0450231$$
$$R_3 = 0.115794$$
$$R_4 = 0.272718$$
$$R_5 = 0.793506$$
$$R_6 = 3.82287$$
$$R_7 = 23.1597$$

Energy: $E = -26630.2813$ (-1.4% accuracy).

95. Americium atom - 95 electrons.

Electron configuration $[\mathrm{Rn}]5f^7 7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 25, 8, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0105669$$
$$R_2 = 0.0445247$$
$$R_3 = 0.114354$$
$$R_4 = 0.268227$$
$$R_5 = 0.775957$$
$$R_6 = 3.82978$$
$$R_7 = 23.148$$

Energy: $E = -27307.9989$ (-1.4% accuracy).

96. Curium atom - 96 electrons.

Electron configuration $[\mathrm{Rn}]5f^7 6d^1 7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 25, 9, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0104564$$
$$R_2 = 0.0440372$$
$$R_3 = 0.11295$$
$$R_4 = 0.26389$$
$$R_5 = 0.748441$$
$$R_6 = 3.51924$$
$$R_7 = 23.4326$$

Energy: $E = -27992.9364$ (-1.4% accuracy).

97. Berkelium atom - 97 electrons.

Electron configuration [Rn]$5f^9 7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 27, 8, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0103482$$
$$R_2 = 0.0435602$$
$$R_3 = 0.111578$$
$$R_4 = 0.259694$$
$$R_5 = 0.74326$$
$$R_6 = 3.84439$$
$$R_7 = 23.1228$$

Energy: $E = -28693.3634$ (-1.4% accuracy).

98. Californium atom - 98 electrons.

Electron configuration [Rn]$5f^{10} 7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 28, 8, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0102423$$
$$R_2 = 0.0430933$$
$$R_3 = 0.11024$$
$$R_4 = 0.255636$$
$$R_5 = 0.728$$
$$R_6 = 3.85199$$
$$R_7 = 23.1094$$

Energy: $E = -29401.1108$ (-1.4% accuracy).

99. Einsteinium atom - 99 electrons.

Electron configuration $[\mathrm{Rn}]5f^{11}7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 29, 8, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0101384$$
$$R_2 = 0.0426364$$
$$R_3 = 0.108933$$
$$R_4 = 0.251708$$
$$R_5 = 0.713398$$
$$R_6 = 3.85973$$
$$R_7 = 23.0956$$

Energy: $E = -30118.9684$ (-1.4% accuracy).

100. Fermium atom - 100 electrons.

Electron configuration $[\mathrm{Rn}]5f^{12}7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 30, 8, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0100367$$
$$R_2 = 0.042189$$
$$R_3 = 0.107656$$
$$R_4 = 0.247903$$
$$R_5 = 0.69941$$
$$R_6 = 3.86756$$
$$R_7 = 23.0816$$

Energy: $E = -30846.9864$ (-1.4% accuracy).

101. Mendelevium atom - 101 electrons.

Electron configuration [Rn]$5f^{13}7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 31, 8, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.009937$$
$$R_2 = 0.0417509$$
$$R_3 = 0.106408$$
$$R_4 = 0.244217$$
$$R_5 = 0.685997$$
$$R_6 = 3.87547$$
$$R_7 = 23.0673$$

Energy: $E = -31585.2149$ (-1.4% accuracy).

102. Nobelium atom - 102 electrons.

Electron configuration [Rn]$5f^{14}7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 32, 8, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00983925$$
$$R_2 = 0.0413217$$
$$R_3 = 0.105189$$
$$R_4 = 0.240642$$
$$R_5 = 0.673122$$
$$R_6 = 3.88341$$
$$R_7 = 23.0528$$

Energy: $E = -32333.7041$ (-1.4% accuracy).

103. Lawrencium atom - 103 electrons.

Electron configuration $[\mathrm{Rn}]5f^{14}7s^27p^1$.

Electron shell configuration $\{2, 8, 18, 32, 32, 8, 3\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00974341$$
$$R_2 = 0.0409013$$
$$R_3 = 0.103998$$
$$R_4 = 0.237188$$
$$R_5 = 0.652693$$
$$R_6 = 3.38934$$
$$R_7 = 16.3274$$

Energy: $E = -33089.2501$ (-1.4% accuracy).

104. Rutherfordium atom - 104 electrons.

Electron configuration $[\mathrm{Rn}]5f^{14}6d^27s^2$.

Electron shell configuration $\{2, 8, 18, 32, 32, 10, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00964941$$
$$R_2 = 0.0404893$$
$$R_3 = 0.102833$$
$$R_4 = 0.233831$$
$$R_5 = 0.633524$$
$$R_6 = 3.2883$$
$$R_7 = 23.6353$$

Energy: $E = -33854.9443$ (-1.4% accuracy).

105. Dubnium atom - 105 electrons.

Electron configuration [Rn]$5f^{14}6d^37s^2$.

Electron shell configuration $\{2, 8, 18, 32, 32, 11, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00955721$$
$$R_2 = 0.0400855$$
$$R_3 = 0.101693$$
$$R_4 = 0.230566$$
$$R_5 = 0.615596$$
$$R_6 = 3.05542$$
$$R_7 = 23.8859$$

Energy: $E = -34630.3927$ (-1.4% accuracy).

106. Seaborgium atom - 106 electrons.

Electron configuration [Rn]$5f^{14}6d^47s^2$.

Electron shell configuration $\{2, 8, 18, 32, 32, 12, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00946675$$
$$R_2 = 0.0396896$$
$$R_3 = 0.100579$$
$$R_4 = 0.227389$$
$$R_5 = 0.598762$$
$$R_6 = 2.85412$$
$$R_7 = 24.1116$$

Energy: $E = -35415.7728$ (-1.4% accuracy).

107. Bohrium atom - 107 electrons.

Electron configuration $[\mathrm{Rn}]5f^{14}6d^5 7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 32, 13, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00937799$$
$$R_2 = 0.0393015$$
$$R_3 = 0.099488$$
$$R_4 = 0.224297$$
$$R_5 = 0.582923$$
$$R_6 = 2.67844$$
$$R_7 = 24.315$$

Energy: $E = -36211.1192$ (-1.4% accuracy).

108. Hassium atom - 108 electrons.

Electron configuration $[\mathrm{Rn}]5f^{14}6d^6 7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 32, 14, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00929088$$
$$R_2 = 0.0389208$$
$$R_3 = 0.0984205$$
$$R_4 = 0.221287$$
$$R_5 = 0.567993$$
$$R_6 = 2.52383$$
$$R_7 = 24.4985$$

Energy: $E = -37016.4664$ (-1.4% accuracy).

109. Meitnerium atom - 109 electrons.

Electron configuration $[\mathrm{Rn}]5f^{14}6d^7 7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 32, 15, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00920537$$
$$R_2 = 0.0385475$$
$$R_3 = 0.0973755$$
$$R_4 = 0.218354$$
$$R_5 = 0.553893$$
$$R_6 = 2.38674$$
$$R_7 = 24.6646$$

Energy: $E = -37831.8489$ (-1.5% accuracy).

110. Darmstadtium atom - 110 electrons.

Electron configuration $[\mathrm{Rn}]5f^{14}6d^9 7s^1$.

Electron shell configuration $\{2, 8, 18, 32, 32, 17, 1\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00912142$$

$$R_2 = 0.0381812$$

$$R_3 = 0.0963523$$

$$R_4 = 0.215498$$

$$R_5 = 0.54043$$

$$R_6 = 2.34501$$

Displacements of shells:

$$d_1 = 1.011262594593197\text{*^-7}$$

$$d_2 = -3.754893356730702\text{*^-7}$$

$$d_3 = 1.226022202312626\text{*^-6}$$

$$d_4 = -3.5209142091194586\text{*^-6}$$

$$d_5 = 0.0000215462$$

$$d_6 = -0.00122855$$

$$d_7 = 45.5271$$

Energy: $E = -38657.2676$ $(100(-39000. - energy[110, 110, Loeser]) - energy[110, 110, Loeser]\%$ accuracy).

111. Roentgenium atom - 111 electrons.

Electron configuration [Rn]$5f^{14}6d^{10}7s^1$.

Electron shell configuration $\{2, 8, 18, 32, 32, 18, 1\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00903899$$

$$R_2 = 0.0378218$$

$$R_3 = 0.0953501$$

$$R_4 = 0.212713$$

$$R_5 = 0.527785$$

$$R_6 = 2.22747$$

Displacements of shells:

$$d_1 = 9.79966954721673\text{*^-8}$$

$$d_2 = -3.635274492017682\text{*^-7}$$

$$d_3 = 1.184190331577537\text{*^-6}$$

$$d_4 = -3.3817304463539186\text{*^-6}$$

$$d_5 = 0.0000200711$$

$$d_6 = -0.000989008$$

$$d_7 = 45.6971$$

Energy: $E = -39492.8001$ (-1.5% accuracy).

112. Ununbium atom - 112 electrons.

Electron configuration $[\mathrm{Rn}]5f^{14}6d^{10}7s^2$.

Electron shell configuration $\{2, 8, 18, 32, 32, 18, 2\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00895804$$

$$R_2 = 0.0374691$$

$$R_3 = 0.0943684$$

$$R_4 = 0.209996$$

$$R_5 = 0.51592$$

$$R_6 = 2.05526$$

$$R_7 = 25.0778$$

Energy: $E = -40338.5524$ (-1.5% accuracy).

113. Ununtrium atom - 113 electrons.

Electron configuration $[\mathrm{Rn}]5f^{14}6d^{10}7s^27p^1$.

Electron shell configuration $\{2, 8, 18, 32, 32, 18, 3\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00887852$$
$$R_2 = 0.0371229$$
$$R_3 = 0.0934064$$
$$R_4 = 0.207347$$
$$R_5 = 0.504643$$
$$R_6 = 1.90778$$
$$R_7 = 17.6161$$

Energy: $E = -41194.3478$ (-1.5% accuracy).

114. Ununquadium atom - 114 electrons.

Electron configuration $[\mathrm{Rn}]5f^{14}6d^{10}7s^27p^2$.

Electron shell configuration $\{2, 8, 18, 32, 32, 18, 4\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0088004$$
$$R_2 = 0.036783$$
$$R_3 = 0.0924637$$
$$R_4 = 0.204762$$
$$R_5 = 0.493904$$
$$R_6 = 1.78037$$
$$R_7 = 13.5635$$

Energy: $E = -42060.2110$ (-1.5% accuracy).

115. Ununpentium atom - 115 electrons.

Electron configuration $[\mathrm{Rn}]5f^{14}6d^{10}7s^27p^3$.

Electron shell configuration $\{2, 8, 18, 32, 32, 18, 5\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00872364$$
$$R_2 = 0.0364492$$
$$R_3 = 0.0915396$$
$$R_4 = 0.20224$$
$$R_5 = 0.48366$$
$$R_6 = 1.6694$$
$$R_7 = 11.0152$$

Energy: $E = -42936.1659$ (-1.5% accuracy).

116. Ununhexium atom - 116 electrons.

Electron configuration $[\mathrm{Rn}]5f^{14}6d^{10}7s^27p^4$.

Electron shell configuration $\{2, 8, 18, 32, 32, 18, 6\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00864821$$
$$R_2 = 0.0361215$$
$$R_3 = 0.0906337$$
$$R_4 = 0.199779$$
$$R_5 = 0.473873$$
$$R_6 = 1.57203$$
$$R_7 = 9.27021$$

Energy: $E = -43822.2365$ (-1.5% accuracy).

117. Ununseptium atom - 117 electrons.

Electron configuration $[\mathrm{Rn}]5f^{14}6d^{10}7s^27p^5$.

Electron shell configuration $\{2, 8, 18, 32, 32, 18, 7\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.00857408$$
$$R_2 = 0.0357995$$
$$R_3 = 0.0897453$$
$$R_4 = 0.197376$$
$$R_5 = 0.464508$$
$$R_6 = 1.486$$
$$R_7 = 8.00401$$

Energy: $E = -44718.4459$ (-1.5% accuracy).

118. Ununoctium atom - 118 electrons.

Electron configuration $[\mathrm{Rn}]5f^{14}6d^{10}7s^27p^6$.

Electron shell configuration $\{2, 8, 18, 32, 32, 18, 8\}$.

Number of shells: 7

Radii of shells:

$$R_1 = 0.0085012$$
$$R_2 = 0.0354833$$
$$R_3 = 0.088874$$
$$R_4 = 0.195029$$
$$R_5 = 0.455535$$
$$R_6 = 1.4095$$
$$R_7 = 7.04533$$

Energy: $E = -45624.8171$ (-1.5% accuracy).