Bohr model in variable dimensionality

Optimal configurations are calculated for different cartesian dimensionalities of the configuration space. For each dimensionality, we list the distances between electrons and the nucleus R and the minimal energy E.

I. NEON ATOM - 10 ELECTRONS.

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

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

Number of shells: 2

A. Ne. Dimensionality 1

Energy: $E = -81.5903384$.

1. *Shell No. 1 (2 electrons)*

Radii:

$$R = 0.0996092822$$

$$R = 0.386129552$$

2. Shell No. 2 (8 electrons)

Radii:

$$R = 0.447801184$$
$$R = 0.742651707$$
$$R = 0.89553411$$
$$R = 1.46006537$$
$$R = 1.9490997$$
$$R = 3.1863024$$
$$R = 8.57114165$$
$$R = 34.1585601$$

B. Ne. Dimensionality 2

Energy: $E = -124.343234$.

1. Shell No. 1 (2 electrons)

Radii:

$$R = 0.102471778$$
$$R = 0.102471831$$

2. Shell No. 2 (8 electrons)

Radii:

$$R = 0.58011791 \text{ (2 electrons)}$$
$$R = 0.611974687 \text{ (2 electrons)}$$
$$R = 0.636471572$$
$$R = 1.89673088$$
$$R = 1.95173587 \text{ (2 electrons)}$$

C. Ne. Dimensionality 3

Energy: $E = -126.053064$.

1. *Shell No. 1 (2 electrons)*

Radii:

$$R = 0.10260885$$

$$R = 0.102624759$$

2. *Shell No. 2 (8 electrons)*

Radii:

$$R = 0.656297239 \text{ (2 electrons)}$$

$$R = 0.664119484 \text{ (2 electrons)}$$

$$R = 0.666956376$$

$$R = 0.692749352$$

$$R = 0.713479588$$

$$R = 3.78111269$$

D. Ne. Dimensionality 4

Energy: $E = -126.776214$.

1. *Shell No. 1 (2 electrons)*

Radii:

$$R = 0.102671729$$

$$R = 0.10277851$$

2. Shell No. 2 (8 electrons)

Radii:

$$R = 0.657088946 \text{ (6 electrons)}$$
$$R = 0.725602205$$
$$R = 2.18245197$$

E. Ne. Dimensionality 5

Energy: $E = -127.096779$.

1. Shell No. 1 (2 electrons)

Radii:

$$R = 0.102728964 \text{ (2 electrons)}$$

2. Shell No. 2 (8 electrons)

Radii:

$$R = 0.701134387 \text{ (4 electrons)}$$
$$R = 0.705665874 \text{ (4 electrons)}$$

F. Ne. Dimensionality 6

Energy: $E = -127.320317$.

1. Shell No. 1 (2 electrons)

Radii:

$$R = 0.10271976$$
$$R = 0.102744277$$

2. Shell No. 2 (8 electrons)

Radii:

$$R = 0.690971421 \text{ (4 electrons)}$$
$$R = 0.696311021 \text{ (3 electrons)}$$
$$R = 0.762786357$$

G. Ne. Dimensionality 7

Energy: $E = -127.534125$.

1. Shell No. 1 (2 electrons)

Radii:

$$R = 0.102743312$$
$$R = 0.102746821$$

2. Shell No. 2 (8 electrons)

Radii:

$$R = 0.695011938 \text{ (5 electrons)}$$
$$R = 0.704061119 \text{ (3 electrons)}$$

H. Ne. Dimensionality 8

Energy: $E = -127.623726$.

1. Shell No. 1 (2 electrons)

Radii:

$$R = 0.10282773 \text{ (2 electrons)}$$

2. Shell No. 2 (8 electrons)

Radii:

$$R = 0.695804347 \text{ (8 electrons)}$$

I. Ne. Dimensionality 9

Energy: $E = -127.623726$.

1. Shell No. 1 (2 electrons)

Radii:

$$R = 0.10282773 \text{ (2 electrons)}$$

2. Shell No. 2 (8 electrons)

Radii:

$$R = 0.695804347 \text{ (8 electrons)}$$