

## Extended Response

### 22.1 The Structure of the Atom 26.

Compare the standing wavelength of an  $n = 2$  orbital to the standing wavelength of an  $n = 4$  orbital.

- The standing wavelength of an  $n = 2$  orbital is greater than the standing wavelength of an  $n = 4$  orbital.
- The standing wavelength of an  $n = 2$  orbital is less than the standing wavelength of an  $n = 4$  orbital.
- There is no relation between the standing wavelength of an  $n = 2$  orbital and the standing wavelength of an  $n = 4$  orbital.
- The standing wavelength of an  $n = 2$  orbital is the same as the standing wavelength of an  $n = 4$  orbital.

27.

Describe the shape of the electron cloud, based on total energy levels, for an atom with electrons in multiple orbital states.

- There are multiple regions of high electron probability of various shapes surrounding the nucleus.
- There is a single solid spherical region of high electron probability surrounding the nucleus.
- There are multiple concentric shells of high electron probability surrounding the nucleus.
- There is a single spherical shell of high electron probability surrounding the nucleus.

### 22.2 Nuclear Forces and Radioactivity 28.

How did Becquerel's observations of pitchblende imply the existence of radioactivity?

- A chemical reaction occurred on the photographic plate without any external source of energy.
- Bright spots appeared on the photographic plate due to an external source of energy.
- Energy from the Sun was absorbed by the pitchblende and reflected onto the photographic plate.
- Dark spots appeared on the photographic plate due to an external source of energy.

### 22.4 Nuclear Fission and Fusion 29.

Describe the potential energy of two nuclei as they approach each other.

- The potential energy will decrease as the nuclei are brought together and then rapidly increase once a minimum is reached.

- b. The potential energy will decrease as the nuclei are brought together.
- c. The potential energy will increase as the nuclei are brought together.
- d. The potential energy will increase as the nuclei are brought together and then rapidly decrease once a maximum is reached.

### **22.5 Medical Applications of Radioactivity: Diagnostic Imaging and Radiation 30.**

Why do X-rays and gamma rays have equivalent RBE values if they provide different amounts of energy to the body?

- a. The penetration distance, which depends on energy, is short for both X-rays and gamma rays.
- b. The penetration distance, which depends on energy, is long for both X-rays and gamma rays.
- c. The penetration distance, as determined by their high mass, is different for both X-rays and gamma rays.
- d. The penetration distance, as determined by their low mass, is the same for both X-rays and gamma rays.