

- How many protons (p), neutrons (n) and electrons (e) are present in the species ${}^7_3\text{Li}^+$?
 - 3 p 4 n 2 e
 - 3 p 4 n 3 e
 - 4 p 3 n 7 e
 - 3 p 4 n 6 e
 - 3 p 4 n 4 e

- Which one of the following phase changes occurs when a substance melts?
 - Gas to liquid
 - Liquid to gas
 - Solid to gas
 - Liquid to solid
 - Solid to liquid

- Which one of the following statements is false?
 - Electrons have a much greater mass than protons.
 - All sodium cations (Na^+) have 11 protons.
 - If an atom loses electrons it becomes positively charged and is called a cation.
 - The argon atom has 18 electrons.
 - Different isotopes of the same element contain different numbers of neutrons.

- How many non-bonding electron pairs (lone pairs) are around the Cl atom in HCl?
 - 0
 - 1
 - 2
 - 3
 - 4

- When a water solution of potassium sulfate is added to a water solution of strontium nitrate, a precipitate of strontium sulfate forms. What is the correctly balanced net ionic equation for the reaction?
 - $\text{K}_2\text{SO}_4(\text{aq}) + \text{Sr}(\text{NO}_3)_2(\text{aq}) \rightarrow \text{SrSO}_4(\text{s}) + 2\text{KNO}_3(\text{aq})$
 - $2\text{K}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) + \text{Sr}^{2+}(\text{aq}) + 2\text{NO}_3^-(\text{aq}) \rightarrow \text{SrSO}_4(\text{s}) + 2\text{K}^+(\text{aq}) + 2\text{NO}_3^-(\text{aq})$
 - $\text{SO}_4^{2-}(\text{aq}) + \text{Sr}^{2+}(\text{aq}) \rightarrow \text{SrSO}_4(\text{s})$
 - $2\text{K}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) + \text{Sr}^{2+}(\text{aq}) + 2\text{NO}_3^-(\text{aq}) \rightarrow \text{SrSO}_4(\text{s}) + 2\text{KNO}_3(\text{s})$
 - $\text{K}^+(\text{aq}) + \text{NO}_3^-(\text{aq}) \rightarrow \text{KNO}_3(\text{s})$

6. Which of the following groups consists only of elements that exist as diatomic molecules at room temperature and pressure?

- a) B, N, O
- b) H, F, Cl
- c) Ne, He, S
- d) Xe, Kr, O
- e) Li, Na, K

7. What is the correct formula for gold(III) oxide?

- a) Au_2O_3
- b) AuO
- c) Au_3O_2
- d) AuO_2
- e) AuO_3

8. Which one of the following compounds is not ionic?

- a) KCl
- b) BaO
- c) SrF_2
- d) Na_2O
- e) CO

9. Which one of the following statements is false?

- a) The atomic emission spectrum consists of a series of discrete lines.
- b) The atomic emission spectrum is unique to each element.
- c) Electrons in an atom are only allowed certain discrete energies.
- d) A photon of energy is always absorbed when it strikes an atom.
- e) The energy of light is directly proportional to its frequency.

10. The thermal decomposition of potassium chlorate is a convenient preparation for small amounts of oxygen gas in the laboratory. The reaction is:



What mass of potassium chlorate would produce a theoretical yield of 10.00 g of oxygen?

- a) 25.5 g
- b) 30.4 g
- c) 38.3 g
- d) 51.1 g
- e) 57.5 g

Correct answers:

1A, 2E, 3A, 4D, 5C, 6B, 7A, 8E, 9D, 10A

- How many protons (p), neutrons (n) and electrons (e) are present in the species ${}_{23}^{51}\text{V}^{3+}$?
 - 23 p 23 n 20 e
 - 23 p 51 n 26 e
 - 23 p 28 n 20 e
 - 26 p 28 n 26 e
 - 26 p 26 n 23 e
- Which one of the following phase changes occurs when a substance sublimates?
 - Gas to liquid
 - Solid to gas
 - Liquid to gas
 - Liquid to solid
 - Solid to liquid
- Which one of the following statements is false?
 - The masses of protons and neutrons are approximately the same.
 - Calcium commonly forms the Ca^{2+} cation.
 - If an atom gains electrons it becomes negatively charged and is called an anion.
 - The xenon atom has 54 protons.
 - Different isotopes of the same element have different chemical behaviour.
- How many non-bonding electron pairs (lone pairs) are around the B atom in BCl_3 ?
 - 0
 - 1
 - 2
 - 3
 - 4
- When dilute hydrochloric acid is added to solid zinc carbonate, a colourless gas is evolved and the solid dissolves. What is the correctly balanced net ionic equation for the reaction?
 - $\text{ZnCO}_3(\text{s}) + \text{HCl}(\text{aq}) \rightarrow \text{ZnCl}(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$
 - $\text{ZnCO}_3(\text{s}) + \text{HCl}(\text{aq}) \rightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$
 - $\text{ZnCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$
 - $\text{ZnCO}_3(\text{s}) + \text{H}^+(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$
 - $\text{ZnCO}_3(\text{s}) + 2\text{H}^+(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$

6. Which of the following groups consists only of elements that exist as monatomic molecules at room temperature and pressure?

- a) B, N, O
- b) H, F, Cl
- c) Ne, He, S
- d) Xe, Kr, Ar
- e) Li, Na, K

7. What is the correct formula for molybdenum(VI) oxide?

- a) Mo_2O_3
- b) MoO
- c) Mo_3O_2
- d) MoO_2
- e) MoO_3

8. Which one of the following compounds is ionic?

- a) HCl
- b) HCN
- c) NO_2
- d) B_2O_3
- e) CaO

9. Which one of the following statements is false?

- a) An electron jumps from a high energy orbital to a lower energy orbital when a photon of energy is emitted by an atom.
- b) The energy of light is directly proportional to its wavelength.
- c) The atomic emission spectrum consists of a series of discrete lines.
- d) The speed of light in a vacuum is constant.
- e) Electrons in an atom are only allowed certain discrete energies.

10. Hydrogen bromide reacts with manganese dioxide according to the following equation.



What mass of bromine can be produced from 6.5 g of hydrogen bromide?

- a) 12.8 g
- b) 6.42 g
- c) 3.21 g
- d) 1.60 g
- e) 0.802 g

Correct answers:

1C, 2B, 3E, 4A, 5E, 6D, 7E, 8E, 9B, 10C