

## Unit 1 Atomic structure MCQ set 1

### Atomic Structure and Properties Multiple Choice I

Name: \_\_\_\_\_

#### CALCULATORS CANNOT BE USED IN THIS SECTION

1)

	Germanium (Ge)
Atomic Radius	128 pm
Electronegativity	2.01

Use the data for germanium in the table above to identify the most probable values for the atomic radius and electronegativity of selenium from the choices below.

- (A) Atomic Radius (155 pm); Electronegativity (2.55)
- (B) Atomic Radius (120 pm); Electronegativity (2.55)
- (C) Atomic Radius (155 pm); Electronegativity (1.85)
- (D) Atomic Radius (120 pm); Electronegativity (1.85)

2) A 20.0 g pure sample of  $\text{Li}_2\text{O}(s)$  contains 46.5% Li by mass. A 10.0 g pure sample of  $\text{Li}_2\text{S}(s)$  is mixed into that 20.0 g pure sample of  $\text{Li}_2\text{O}(s)$ . Which of the following statements identifies what happened to the mass percent of lithium in the final mixture, when compared to a pure sample of  $\text{Li}_2\text{O}(s)$ , with a correct justification?

- (A) The mass percent of lithium in the final mixture would be greater than 46.5% because both compounds contain lithium.
- (B) The mass percent of lithium would remain the same because the ratio of lithium to oxygen is 2:1 for both compounds.
- (C) The mass percent of lithium in the final mixture would be greater than 46.5% because sulfur has a larger atomic mass than oxygen.
- (D) The mass percent of lithium in the final mixture would be less than 46.5% because sulfur has a larger atomic mass than oxygen.

3) Which of the following choices provides the most probable values for the first four ionization energies of aluminum?

- (A)  $IE_1 = 738 \text{ kJ/mol}$ ,  $IE_2 = 1451 \text{ kJ/mol}$ ,  $IE_3 = 7733 \text{ kJ/mol}$ ,  $IE_4 = 10543 \text{ kJ/mol}$
- (B)  $IE_1 = 578 \text{ kJ/mol}$ ,  $IE_2 = 1817 \text{ kJ/mol}$ ,  $IE_3 = 2745 \text{ kJ/mol}$ ,  $IE_4 = 11577 \text{ kJ/mol}$
- (C)  $IE_1 = 787 \text{ kJ/mol}$ ,  $IE_2 = 1577 \text{ kJ/mol}$ ,  $IE_3 = 3232 \text{ kJ/mol}$ ,  $IE_4 = 4356 \text{ kJ/mol}$
- (D)  $IE_1 = 1012 \text{ kJ/mol}$ ,  $IE_2 = 1907 \text{ kJ/mol}$ ,  $IE_3 = 2914 \text{ kJ/mol}$ ,  $IE_4 = 4964 \text{ kJ/mol}$

4) Removing a single electron from which of the following neutral atoms in the gas phase would require the greatest amount of energy?

- (A) K
- (B) Rb
- (C) Br
- (D) I

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5) Which of the following lists K, Na, Cl, and Br in order of decreasing atomic radius?

- (A)  $K > Na > Br > Cl$
- (B)  $Na > K > Cl > Br$
- (C)  $Cl > Br > Na > K$
- (D)  $Br > Cl > Na > K$

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6) A pure sample of a hydrocarbon, a compound containing only hydrogen and carbon, was burned in the presence of excess oxygen gas. The results showed that 58.7 g of  $CO_2$  and 27.0 g of  $H_2O$  were produced. Which of the following is the empirical formula for the compound? ( $MM$  of  $CO_2$  is 44 g/mol and  $MM$  of  $H_2O$  is 18 g/mol)

- (A)  $CH_2$
- (B)  $C_4H_9$
- (C)  $C_2H_5$
- (D)  $C_3H_5$

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7) Identify the answer choice that lists  $^{62}Co$ ,  $^{64}Ni$ ,  $^{61}Cu$ , and  $^{64}Zn$  in order of increasing number of neutrons.

- (A)  $^{61}Cu < ^{62}Co < ^{64}Zn < ^{64}Ni$
- (B)  $^{61}Cu < ^{64}Zn < ^{62}Co < ^{64}Ni$
- (C)  $^{62}Co < ^{64}Ni < ^{61}Cu < ^{64}Zn$
- (D)  $^{62}Co < ^{61}Cu < ^{64}Zn < ^{64}Ni$

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8) Which of the following lists Mg, Ca, Se, and Cl in order of increasing electronegativity?

- (A)  $Ca < Mg < Se < Cl$
- (B)  $Cl < Se < Mg < Ca$
- (C)  $Mg < Cl < Ca < Se$
- (D)  $Mg < Ca < Cl < Se$