SECOND SEMESTER FIRST MIDTERM EXAM. 1437-1438H (2016-2017 G)

Choose the correct answer:

1. The mass (in g) of "Si" present in 5.0 g of "$C_9H_{23}NO_3Si$" is:

   A) 0.63 B) 0.86 C) 0.32 D) 0.44

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2. The number of molecules of ascorbic acid ($C_6H_8O_6$) present in 500.0 mg is:

   A) 2.42×10^{21} B) 1.71×10^{24} C) 2.42×10^{24} D) 1.71×10^{21}

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3. Nylon contains 63.68% C, 12.38% N, 9.80% H, and 14.14% O by mass. The empirical formula formula for nylon is:

   A) $C_6H_{11}N_2O$ B) $C_6H_{11}NO_2$ C) $C_6H_{11}NO$ D) C_6H_6NO

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4. For the following reaction:

   $$5X + 2C \rightarrow X_5C_2$$

   If 7.89 g of carbon "C" react with 92.10 g of an element "X", then the molar mass (in g/mol) of "X" is:

   A) 56 B) 45 C) 65 D) 95

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5. Given the following reaction:

   $$Fe_2O_3(s) + 2Al(s) \rightarrow 2Fe(l) + Al_2O_3(s)$$

   The mass (in g) of iron (III) oxide (Fe_2O_3) must be used to produce 15.0 g iron is:

   A) 42.8 B) 21.5 C) 12.9 D) 31.5

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6. Given the following reaction:

   $$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$$

   If the reaction has a 72.7% yield, then the mass (in g) of O_2 needed to produce 120 g of H_2O is:

   A) 293.31 B) 49.78 C) 146.72 D) 112.65

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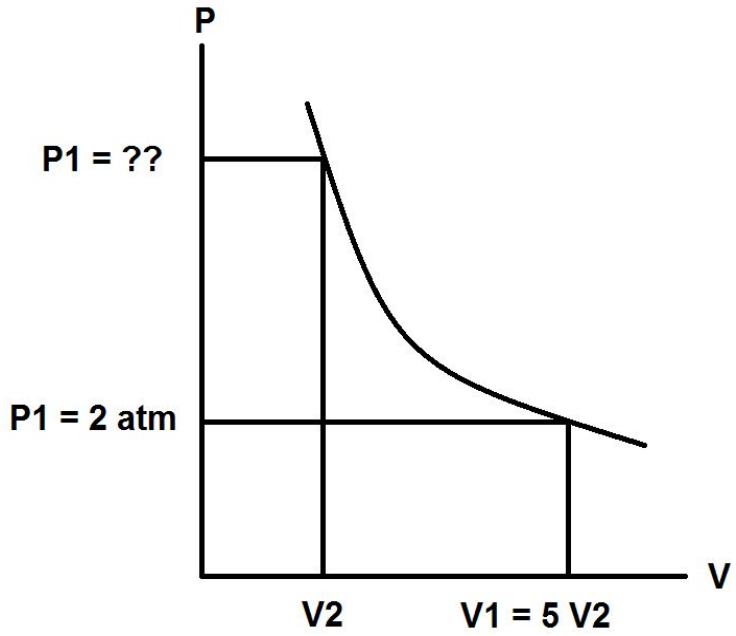
7. An aqueous solution of C_2H_5OH (56%) by mass, the mole fraction of C_2H_5OH is:

A) 0.67 B) 0.33 C) 0.56 D) 0.44

8. The molarity of a solution prepared by dissolving 158.0 g of potassium permanganate ($KMnO_4$) in enough water to make 750 mL solution is:

A) 1.33 B) 0.98 C) 0.73 D) 1.62

9. The diagram shown below represents the change in pressure (P) with volume (V) of 5.0 g gas at constant temperature (T):



The final pressure (in atm) is:

A) 5.0 B) 7.0 C) 15.0 D) 10.0

10. A flask is filled with a gas at 21.0 C and 0.98 atm, and heated. If the pressure inside the flask becomes 3.25 atm, the gas temperature (in **C**) will be:

A) 702 B) 70 C) 254 D) 975

11. Sulfur hexafluoride (SF_6) boils at -64 C. The density (in g/L) of sulfur hexafluoride vapor at the same temperature and 745 torr is:

A) 62.59 B) 2.04 C) 8.34 D) 27.25

12. A sample of gas mixture at 750 torr contains 75.0% nitrogen (N_2) and 25.0% oxygen (O_2) by msas. The partial pressure (in **torr**) of oxygen is:

A) 563 B) 170 C) 204 D) 480

13. The root-mean-square speed (in **m/s**) of O_3 molecules at -23 C is:

A) 3.6×10^2 B) 5.4×10^2 C) 4.2×10^2 D) 1.8×10^2

15. Given the following reaction:

$$3H_2(g) + N_2(g) \rightarrow 2NH_3(g)$$

0.71 mol of hydrogen gas "H_2" is allowed to react completely with enough amount of nitrogen gas "N_2". If "NH_3" gas is collected in a 11.0 L gas vessel at 30 C, the NH_3 gas pressure (in atm) inside the vessel is:

A) 1.07 B) 0.83 C) 1.21 D) 1.32