

Broward Teaching Center

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1. Which of the following values has 3 significant figures?

(1) 0.032

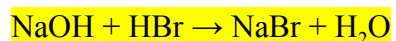
(2) 700

(3) 50.

(4) 0.000430

(5) .004

2. 57mL of 0.50 M solution of sodium hydroxide is needed to neutralize 22mL of hydrobromic acid of unknown concentration during a titration. Write out the reaction formula then find the unknown concentration of the acid.



1.3 M

3. Compound Z has two stable isotopes: Z-45 and Z-44. Z-45 has a mass of 44. 9757 amu and Z-44 has a mass of 43.899 amu. If the atomic mass of Z is 44.3026 amu, then what is the abundance of isotope Z-44?

(1) 37.5%

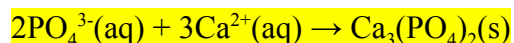
(2) 62.5%

(3) 78.3%

(4) 23.3%

(5) 13.5%

4. Determine the net ionic equation of the reaction between sodium phosphate and calcium nitrate.



5. Complete combustion of a hydrocarbon yielded 3.2 g of H_2O and 4.5 g of CO_2 . If the sample was found to have a mass of 124.3 g/mol, how many carbons are in the molecular formula of the hydrocarbon?

- (1) 2
- (2) 4
- (3) 5
- (4) 6
- (5) 8

6. What is the percent mass of hydrogen in the molecular formula of the hydrocarbon determined in the previous question?

- (1) 22.7%
- (2) 32.1%
- (3) 87.3%
- (4) 11.2%
- (5) 32.5%

7. 10.2 mL of 0.30 M ammonium carbonate and 14.2 mL of 0.45 M of magnesium sulfate solutions undergo a double displacement reaction, what is the concentration of the insoluble product?

- (1) 0.225 M
- (2) 0.500 M
- (3) 0.750 M
- (4) 0.125 M
- (5) 0.450 M

8. What is the mass of the excess reactant in the previous problem?

- (1) 0.500 g
- (2) 0.401 g
- (3) 0.223 g
- (4) 0.445 g
- (5) 0.695 g

9. Which of the following pairs have the higher boiling point?

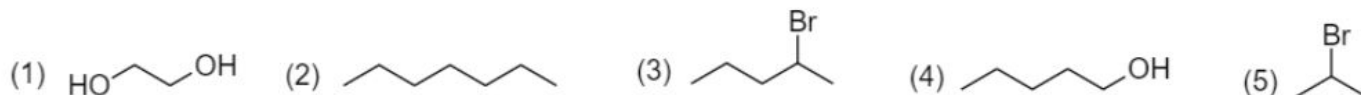
A: $\text{CH}_3\text{CH}_2\text{OH}$ vs. $\text{CH}_3\text{CH}_2\text{Br}$

B: H_2O vs. H_2S

C: Propane (C_3H_8) vs. Decane ($\text{C}_{10}\text{H}_{22}$)

- (1) $\text{CH}_3\text{CH}_2\text{OH}$, H_2S , Propane
- (2) $\text{CH}_3\text{CH}_2\text{OH}$, H_2O , Decane
- (3) $\text{CH}_3\text{CH}_2\text{Br}$, H_2S , Decane
- (4) $\text{CH}_3\text{CH}_2\text{Br}$, H_2O , Propane

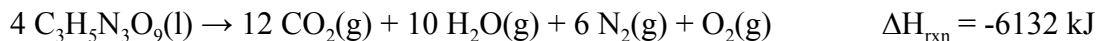
10. Which of the following would you expect to have the highest vapor pressure at a given temperature? (2)



11. Consider a solution that is 43% (m/m) bromoform (CHBr_3) in acetone ($\text{C}_3\text{H}_6\text{O}$). What volume of bromoform would be needed to prepare 400 mL of this solution?

- (1) 55.6 mL
- (2) 20.3 mL
- (3) 68.5 mL
- (4) 90.3 mL
- (5) 32.1 mL

12. The explosive nitroglycerin ($\text{C}_3\text{H}_5\text{N}_3\text{O}_9$) decomposes rapidly upon ignition according to the following equation:



Calculate the standard enthalpy of formation (ΔH_f) for nitroglycerin. For $\text{CO}_2(\text{g})$, $\Delta H_{\text{rxn}} = -393.5$ kJ/mol. For $\text{H}_2\text{O}(\text{g})$, $\Delta H_{\text{rxn}} = -241.82$ kJ/mol.

(1) -252.05 kJ/mol

(2) -1008 kJ/mol

(3) 458.8 kJ/mol

(4) 569.7 kJ/mol

(5) -392.1 kJ/mol

13. Which specie is isoelectronic with Ar?

(1) Ne

(2) F^-

(3) O^{2-}

(4) Ca^{2+}

(5) Mg^{2+}

14. What are the correct molecular geometries for XeF_4 , SOCl_2 , SF_6 , ClF_5 , H_2O respectively?

Square planar; trigonal pyramidal; octahedral; square pyramidal; bent

15. In a coffee-cup calorimeter, 2.45 g of KNO_3 is dissolved in enough water to make 25.0 mL of solution. The initial temperature is 26.5°C and the final temperature is 21.3°C . Calculate the change in enthalpy for the dissolution of KNO_3 in kJ/mol. (Assuming 1.0 g/mL as the density of the solution).

(1) 11.2 kJ/mol

(2) 4.22 kJ/mol

(3) 22.4 kJ/mol

(4) 72.5 kJ/mol

(5) 34.9 kJ/mol

16. The laser emits photons with $\lambda = 640 \text{ nm}$. How many photons from this laser would be required to heat 13.5 g of pure solid lead (specific heat capacity = $0.127 \text{ J/}^\circ\text{C}\cdot\text{g}$) from 25°C to its melting point (327°C)?

- (1) 2.31×10^{23}
- (2) 6.77×10^{20}
- (3) 4.04×10^{18}
- (4) 2.03×10^{18}
- (5) 1.67×10^{18}

17. What atom has the electron configuration: $[\text{Xe}] 6s^1 4f^{14} 5d^{10}$; Next, what is the electron configuration of Tungsten (W) using the noble gas abbreviation?

Au; $[\text{Xe}] 6s^2 4f^{14} 5d^4$

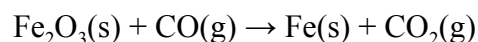
18. How many atoms of sulfur are in a 4.0 g sample of S_7O_2 ?

- (1) 5.44×10^{23}
- (2) 6.87×10^{22}
- (3) 2.12×10^{22}
- (4) 6.57×10^{22}
- (5) 9.33×10^{23}

19. Identify the conjugate acid and base when hydrobromic acid reacts with water.

$\text{HBr} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{Br}^-$ H_3O^+ is the conj. acid; Br^- is the conj base

20. The following reaction is used to obtain iron from iron ore:



The reaction of 88.32 g Fe_2O_3 with 102.3 g CO produces 43.5 g CO_2 . Determine the percent yield. (Don't forget to check if the reaction is balanced)

- (1) 69.3%
- (2) 93.2%
- (3) 11.2%
- (4) 43.6%
- (5) 59.6%