6AExam3
Answer Section

MULTIPLE CHOICE

1.	ANS: C	PTS: 1
2.	ANS: C	PTS: 1
3.	ANS: D	PTS: 1
4.	ANS: A	PTS: 1
5.	ANS: A	PTS: 1
6.	ANS: A	PTS: 1
7.	ANS: D	PTS: 1
8.	ANS: D	PTS: 1
9.	ANS: B	PTS: 1
10.	ANS: A	PTS: 1
11.	ANS: C	PTS: 1
12.	ANS: B	PTS: 1
13.	ANS: B	PTS: 1
14.	ANS: D	PTS: 1
15.	ANS: B	PTS: 1
16.	ANS: A	PTS: 1
17.	ANS: D	PTS: 1
18.	ANS: C	PTS: 1
19.	ANS: D	PTS: 1
20.	ANS: A	PTS: 1
21.	ANS: C	PTS: 1
22.	ANS: D	PTS: 1
23.	ANS: C	PTS: 1
24.	ANS: C	PTS: 1
25.	ANS: C	PTS: 1
26.	ANS: D	PTS: 1
27.	ANS: C	PTS: 1
28.	ANS: C	PTS: 1

TRUE/FALSE

29.	ANS: T	PTS: 1
30.	ANS: T	PTS: 1

1. (5 points) Calculate the amount of energy (heat) needed to change the temperature of liquid water $\underline{1.5\,L}$ from $10.0^{\circ}C$ to $55.0^{\circ}C$.

$q\,(heat) = mC\Delta T$

The specific heat of water is: $4.18\dfrac{J}{g\cdot^{\circ}C}$

$$q = 1.5\,L \times \frac{10^{3}\,mL}{1\,L} \times \frac{1.00\,g}{1\,mL} \times 4.184\,\frac{J}{g\,^{\circ}C} \times (55.0-10.0)\,^{\circ}C$$

$(2\ sf)$ Answer: $\underline{2.8 \times 10^{5}\ J}$

2. (5 points) Calculate the total pressure in a 3.0 L tank that contains 2.0g of $H_2(g)$, 16g of $O_2(g)$ and 14g of $N_2(g)$ at $25.0^{\circ}C$.

$PV = nRT \quad P = nRT/V$

$$2.0\,g\,H_2 \times \frac{mol}{2.0\,g} = 1.0\,mol\,H_2$$

$$16\,g\,O_2 \times \frac{1\,mol}{32.0\,g} = 0.50\,mol\,O_2$$

$$14\,g\,N_2 \times \frac{1\,mol}{28.0\,g} = 0.50\,mol$$

$$P = \frac{2.0\,mol \times R \times 298K}{3.0\,L}$$

Answer: $\underline{16\ atm\ (2sf)}$

3.(5 points) Calculate the wt % of NaCl that is in a solution that is made by dissolving 5.0g of NaCl and 4.0g of $NaNO_3(s)$ in 51.0 ml of water.

$\% = {}^{g\,NaCl}\!/_{g\,Solution} \times 100$

$$\frac{5.0\,g\,NaCl}{5.0\,g\,NaCl + 4.0\,g\,NaNO_3 + 51.0\,mL \times \frac{1.00\,g}{1\,mL}} \times 100 =$$

Answer: $\underline{8.3\ \%\ NaCl}$

4. (5 points) Calculate the number of grams of sodium in 325 mL of a 0.100M NaCl solution.

$$325\,mL \times \frac{L}{10^{3}\,mL} \times \frac{0.100\,mol\,NaCl}{1\,L} \times \frac{1\,mol\,Na}{1\,mol\,NaCl} \times \frac{22.99\,g\,Na}{1\,mol\,Na}$$

$(3sf)$ Answer: $\underline{0.747\ g\ Na}$

5. (5 points) What is the sodium ion concentration (mols/L) of a solution that is prepared by dilution 10.0mL of a 0.500 M Na_2SO_4 solution to a final total volume of 100.0 mL in a volumetric flask.
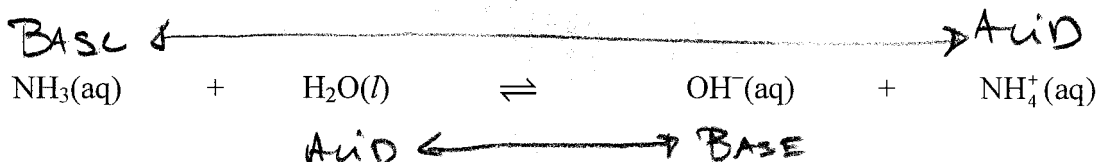
$C_1V_1 = C_2V_2$

$$C_2 = \frac{C_1V_1}{V_2} = \frac{0.500 \, M \, Na_2SO_4 \cdot 10.0 \, mL}{100.0 \, mL} \times \frac{2 \, mol \, Na^+}{1 \, mol \, Na_2SO_4} =$$

(3 sf)   Answer: $\underline{0.100 \, M \, Na^+}$

6. (5 points) Classify the following as a (N) non-electrolyte, (S) strong electrolyte, (W) weak electrolyte or (P) precipitate in and aqueous solution. *(use the capital letter in parenthesis)*
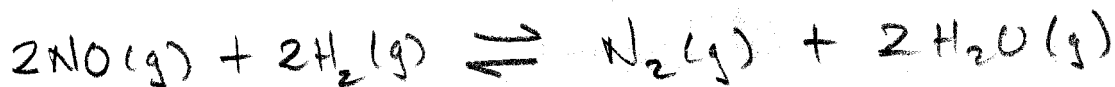
(a) NaCl(aq) __S__   (b) Acetic acid __W__   (c) Fe_2S_3 __P__   (d) methanol __M__

(e) lead (II) nitrate __S__

7. (5 points) Label the conjugate acid and base pairs in the following reaction:

BASE ⟵————————————————————⟶ ACID

NH₃(aq)   +   H₂O(l)   ⇌   OH⁻(aq)   +   NH₄⁺(aq)

ACID ⟵————————⟶ BASE

8. (5 points) Write the chemical equation that describes the following equilibrium constant expression.

$$K = \frac{[N_2][H_2O]^2}{[NO]^2[H2]^2}$$

$2NO(g) + 2H_2(g) \rightleftharpoons N_2(g) + 2H_2O(g)$

9. (5 points) Calculate the hydroium ion concentration ($[H_3O^+] = [H^+]$) of a solution that has a pH of 7.48.

$pH = -\log[H^+]$

$[H^+] = 10^{-pH}$

$= 10^{-7.48}$ $= 10^{0.52} \times 10^{-8}$

Answer: $\underline{3.3 \times 10^{-8}}$ (2 sf)

10. (5 points) Calculate the pH of a 0.0045M NaOH solution.

$pH + pOH = 14.00$

$pOH = 2.35$ $\therefore \, pH = 11.65$

Answer: $\underline{11.65}$ (4 sf)