



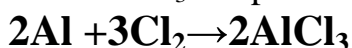
Note: Answer all questions.

Q1)

1. Give the names and formulas of (a) three strong acids , (b) three weak acids, (c) three strong base, (d) three weak bases.
2. give an example of a solution that contains each of the following : (a) a solid dissolved in a liquid ; (b) a gas dissolved in a liquid ; (c) a liquid dissolved in liquid; (d) a solid dissolved in a solid;(e) a liquid dissolved in a gas

Q2) (Answer two questions only)

1. A 500.0-g sample of potassium phosphate is dissolved in enough water to make 1.50 L of solution. What is the molarity of the solution?
2. What mass of iron (III) oxide reacted with excess carbon monoxide if the carbon dioxide produced by the reaction had a mass of 8.65 grams?
3. When 80 grams of aluminum is reacted with excess chlorine gas, how many moles of AlCl_3 are produced?



Q3)

1. A solution is prepared by mixing 500. mL of 0.10 M NaOCl and 500. mL of 0.20 M HOCl . What is the pH of this solution? [$K_a(\text{HOCl}) = 3.2 \times 10^{-8}$].
2. A 0.2356 g sample containing only NaCl (fwt 58.44 g/mol) and BaCl_2 (fwt 208.23 g/mol) yielded 0.4637 g of dried AgCl (fwt 143.32 g/mol). Calculate the percent of each halogen compound in the sample.

Q4) A solution contains 0.020 M Ag^+ and Pb^{2+} . Add CrO_4^{2-} to precipitate red Ag_2CrO_4 and yellow PbCrO_4 . Which precipitates first? How much Pb^{2+} remains in solution when Ag^+ begins to precipitate?

$$K_{\text{sp}} \text{ for } \text{Ag}_2\text{CrO}_4 = 9.0 \times 10^{-12}$$

$$K_{\text{sp}} \text{ for } \text{PbCrO}_4 = 1.8 \times 10^{-14}$$

Q5) A 25.0 ml sample of 0.150 M HNO_3 is titrated with 0.10M NaOH . Calculate the pH of solution (a) before the addition of NaOH and after the addition of (b) 6.0 ml (c) 15.0 ml (d) 37.5 ml (e) 45.0ml of NaOH solution .

(Notes: Ten marks for each question)



Q₁) Write the solubility product expression for the following salts

a) AgCl b) $Pb_3(AsO_4)_2$ c) barium sulfate d) $Fe(OH)_3$ e) Calcium sulfate

Q₂) 1.How many grams of LiOH is needed to prepare 250.0 mL of a 1.25 M solution?

2.How much calcium carbonate will be precipitated by adding 25.0 mL calcium chloride to 25.0 mL of 0.56 M potassium carbonate?

Q₃) If we added 0.010 mol of solid NaOH to 1.0 liter of a buffer solution that is 0.10M of CH_3COOH and 0.10 M CH_3COONa , how much will $[H^+]$ and pH change? Assume that there is no change due to addition of solid NaOH solution

Q₄)

1. Decide whether aqueous solutions of the following salts are acidic , basic , or neutral :

a. KCl ; b. NaF ; c. CH_3COOH ; d. NH_4CN

2. What is the pH of a buffer made by adding 0.10 mol NH_3 and 0.11 mol NH_4Cl to 2.0 L of solution? The K_b for ammonia is 1.8×10^{-5}

Goodluck



Q1)

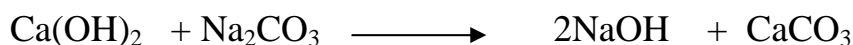
- A. Distinguish between a compound and a mixture.
- B. Define a buffered solution . what makes up a buffered solution ? Explain how buffers absorb added H^+ , OH^- with little pH change.

Q2)

- A. The amount of heat released or absorbed in the dissolution process is important in determining whether the dissolution process is spontaneous ,whether it can occur What is the other important factor? How does it influence solubility?
- B. What is the molarity of a barium hydroxide solution if 44.1 mL of 0.103 M HCl is required to react with 38.3 mL of the $Ba(OH)_2$ solution?

Q3)

- A. How many grams of sodium hydroxide can be produced from 500g of calcium hydroxide according to this equation?



- B. You have 50.0 mL of 3.0 M NaOH and you want 0.50 M NaOH. What do you do?

Q4)

- A. a mixture of mercurous chloride (FW 472.09) and mercurous bromide(FW 560.99) weighs 2.00 g. The mixture is quantitatively reduced to mercury metal (At wt 200.59) which weighs 1.50g. Calculate the % mercurous chloride and mercurous bromide in original mixture.
- B. How would you prepare 9.70 g of $PbCl_2(s)$ from a 0.10 M solution of $Pb(NO_3)_2$ and a 0.20 M solution $CaCl_2$.

Q5) A 44.0 mL sample of 0.202M CH_3COOH solution is titrated with 0.185 M NaOH Calculate the pH of the solution (a)before the addition of any NaOH solution and after the addition (b) 15.5mL,(d)24.0mL,(e)48.0mL , (f)50.2mL of NaOH solution.

(Notes: Ten marks for each qution)



Q1) write the number of the question and the sign of the right choice

1. A measure of solution concentration calculated as the number of moles of solute dissolved in one litre of solution is known as:

- a. ppm. b. molarity c. normality d. molality.

2. When Ba^{2+} (aq) ions are added to an unknown solution, large amounts of a white precipitate form immediately. The unknown solution could be which of the following:

- a. NaCl b. Na_2SO_4 c. HNO_3 d. CH_3COOH

3. What is the molarity of 200 mL of solution in which 2.0 moles of sodium bromide is dissolved?

- a. 2.0 M b. 0.40 M c. 10 M d. 4.0 M

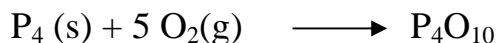
4. Consider the reaction:



How many moles of ammonia gas (NH_3) are required to completely react with 1.35 mol of O_2 gas?

- a. 1.08 mol b. 1.35 mol c. 1.68 mol d. 6.75 mol

5. Consider the following reaction:



How many grams of P_4O_{10} are produced when 24.8 g of P_4 reacts with 6.4 g of O_2 ?

- a. 11.4 g b. 31.2 g c. 45.2 g d. 56.8 g

Q2) Write the solubility product expression for the following salts

a) AgCl b) b) barium sulfate c) Iron(III)hydroxide d) Calcium sulfate

Q3) The mineral fluorite is calcium fluoride, CaF_2 . Calculate the solubility (in gram per liter) of calcium fluoride in water from the solubility product constant (3.4×10^{-11}).

Q4)A. What is the pH of a buffer solution that contains 0.25 M benzoic acid ($\text{C}_6\text{H}_5\text{CO}_2\text{H}$) and 0.15 M sodium benzoate ($\text{C}_6\text{H}_5\text{COONa}$). [$K_a = 6.5 \times 10^{-5}$ for benzoic acid].

B. The compound *para*-aminobenzoic acid (you may have seen it listed as PABA on your bottle of sunscreen) is composed of carbon (61.31%), hydrogen (5.14%), nitrogen (10.21%), and oxygen (23.33%). Find the empirical formula of PABA.

Q5) Calculate the mass of ammonia that can be produced from the decomposition of a sample of $(\text{NH}_4)_2\text{PtCl}_6$ containing 0.10 g Pt.

PERIODIC TABLE OF THE ELEMENTS

1 H 1.008																	2 He 4.003	
3 Li 6.941	4 Be 9.012												5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31												13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80	
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3	
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 181.0	74 W 183.8	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)	
87 Fr (223)	88 Ra 226.0	89 Ac 227.0	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 (269)	111 (272)	112 (277)							

58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
90 Th 232.0	91 Pa 231.0	92 U 238.0	93 Np 237.0	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)