PART 2 **NAME** ……

Circle your teacher's name (Callus / Kanakis / Hill)

Answer all questions in part 2 in the spaces below

1 Write balanced equations to describe any reaction in the following (If there is no reaction , write "N R") .Ionic equations must be written where relevant

(a) zinc hydroxide + nitric acid

. . . . . .

(b) sodium phosphate solution plus calcium nitrate solution

. . . . . .

(c) acetic acid (ethanoic acid) plus sodium hydroxide solution

. . . . . .

(d) solid sodium nitrate dissolving in water

. . . . . .

(e) . potassium carbonate solution added to hydrochloric acid

. . . . . .

(f) aluminium plus dilute sulfuric acid

. . . . . .

(g) copper nitrate solution mixed with zinc sulfate solution.

. . . . . .

(14)

2 For each of the following pairs of substances describe a test that would distinguish between them and the observations that would enable this to be done .

(a) Solid sodium nitrate and solid zinc carbonate

Test : . . . .

Observations. . . . .

. . . .

(b) zinc nitrate solution and sodium phosphate solution

Test : . . . .

Observations. . . . .

. . . .

(c) Nitric acid and sulfuric acid and solid zinc carbonate

Test : . . . .

Observations. . . . .

. . . .

(6)

3 Write the pH of :

(a) 0.01 M $Ba(OH)_2$ solution ……

(b) 0.1 M KCl ……

(c) 0.1 M Na_3PO_4 ……..

(d) 0.145 M NaOH ……..

(4)

4 In the following table write either the formula or name of the an example of the substance described :

Substance	Name or formula
A concentrated solution of a weak base	
A diprotic acid	
An anion that forms basic solutions	
An oxidising agent that can be reduced by acidified KBr solution	
A molecule that can undergo disproportionation	
A reducing agent that will reduce Sn^{2+} to Sn but not Al^{3+} to Al	
An oxidising agent stronger than Cl_2	

(7)

5 Write equations to show the HCO_3^- ion acting as an acid and as a base

<u>As acid</u> . . . . . .

<u>As base</u> . . . . . .

(2)

6 Explain why (use equations to illustrate your answer)

(a) The pH of a solution of sodium acetate is not 7

. . . .

. . . .

. . . .

(b) A small temperature increase can result in a large increase in reaction rate (2 reasons)

. . . .

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. . . . ………. ……………………………………………………………………….

(c) Copper sulfate solution cannot be stored in a zinc container

. . . .

. . . .

. . . . ………. ……………………………………………………………………

(6)

7 Create balanced half equations to describe the following changes

(a) $S_2O_3^{2-}$ is converted to SO_4^{2-}

(b) MnO_2 is converted to Mn

(4)

8 For each of the following reactions , write half equations , redox equations and name the oxidising and reducing agents

(a) Acidified $KMnO_4$ is added to a solution of oxalic acid (HOOCCOOH)

Oxidation half equation

Reduction half equation

Redox equation

Oxidising agent ……. Reducing agent ……

(4)

(b) Potassium dichromate solution ($K_2Cr_2O_7$),acidified with sulfuric acid is mixed with a solution of sodium iodide

Oxidation half equation

Reduction half equation

Redox equation

Oxidising agent ……. Reducing agent ……

(4)

9 Consider the following equilibrium :

$$P_2O_{5\,(g)} + 5CO_{(g)} \;\text{<=== >}\; 5CO_{2(g)} + 2P_{(s)} + 250kJ$$

Complete the table below to describe how and why the following changes influence the equilibrium amount of CO_2

Change	Amount of CO_2 present at equilibrium (more ,less, same)	Reason
System is heated		
Pressure is increased		
Solid P is added		

(6)

(c) Complete the table below to describe how the following changes effect the **rate** of forward reaction at the new equilibrium .

Change	Effect on forward reaction rate
System is cooled	
Volume is halved	

(2)

10 On the enthalpy –reaction pathway diagrams below , sketch curves to represent the reactions described

(a) An endothermic reaction with heat of reaction 85 kJmol^{-1} and activation energy 120 kJ mol^{-1}

(b) Burning natural gas in air (no values required – only the general shape of the curve

(4)

11 A solution of vinegar (acetic acid) is placed in a conical flask and titrated with a standardised NaOH solution. The NaOH is placed in the burette .

(a) Suggest a suitable indicator for this titration. …….. (1)

(b) Explain , using the terms pH , end point , equivalence point , hydrolysis etc why this indicator is chosen(an equation will help your answer)

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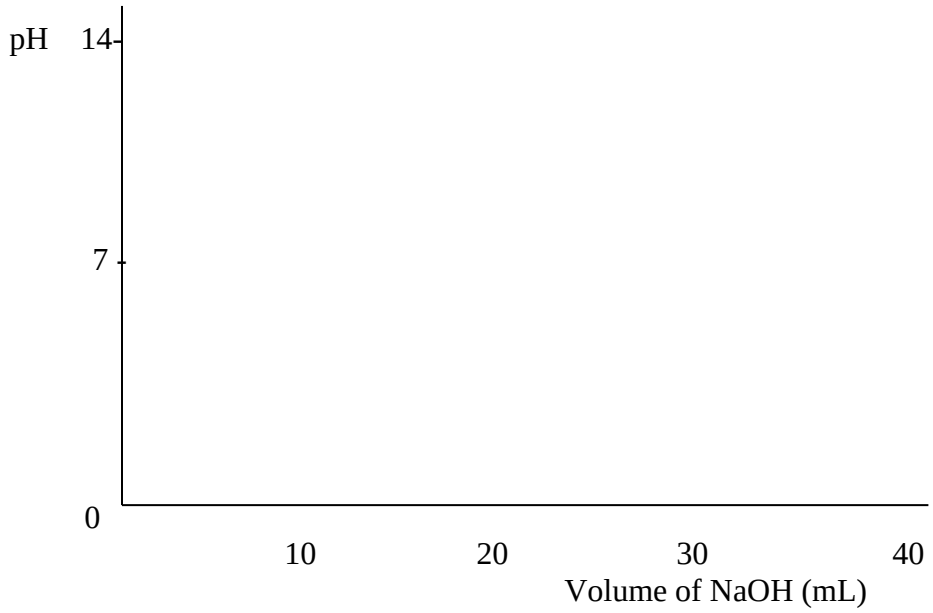
(2)

(c) The volume of NaOH required to titrate the vinegar sample is 27.20mL
Sketch a titration curve to show how the pH of the contents of the conical flask varies With volume of NaOH delivered from the burette for the first 40mL delivered .



(2)

END OF PART 2

PART 4 **NAME** ……..

Teacher (Callus / Kanakis / Hill)

Answer **ONE** of the following extended answer questions . Where applicable use equations , diagrams ,and illustrative examples of the chemistry you are describing.

Marks are awarded for the relevant chemical content of your answer , but marks will be lost for lack of clarity or coherence . Your answer should be presented in 2-3 pages and should be commenced in the space immediately following the choice of topic. This part carries 20 marks and is worth 10% of the paper/

1 Consider the following solutions :

0.1 M NaCl , 0.1 M HNO_3 . 0.1 M KNO_3 , 0.1 M NH_4Cl , 0.1 M Na_3PO_4 , 0.1 M KOH and 0.1 M Na_2CO_3 ,

For each solution , predict the concentration of H^+ ions and explain the source of these ions. Your answer should draw upon such concepts as

Definition of acids and bases
Strength of acids / bases
Hydrolysis of salts
Ionisation of water

2 The percentage of sodium carbonate in a contaminated sample of it can be determined by titration with standardised HCl solution . Describe techniques equipment and procedures involved in this analysis . Assume you have been supplied with standardised HCl labelled "0.1342M" and a carefully weighed 3.452g sample of the impure Na_2CO_3 .

3 Describe how the rate of chemical reactions depends on the conditions affecting collisions between reacting particles

End of paper

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