05 Acids, Bases and Salts

Set A Concept Practice

Name | Time **50 minutes** | Total **42 marks** | Score ____ / 42

A From the lesson

25 MARKS

1 Which statement about 0.10 mol dm^{-3} hydrochloric acid and 0.10 mol dm^{-3} ethanoic acid is correct?

A They have the same pH.

B Hydrochloric acid has the higher concentration of H^+ ions.

C Ethanoic acid is the more concentrated acid.

D Both acids are fully ionised.

/1

Answer ☐ [1]

Learners' Alley, Acids, Bases and Salts slides

2 Which oxide reacts with both dilute hydrochloric acid and aqueous sodium hydroxide?

A copper(II) oxide **B** carbon dioxide **C** aluminium oxide **D** carbon monoxide

/1

Answer ☐ [1]

Learners' Alley, Acids, Bases and Salts slides

3 What is the conjugate base of HSO_4^-?

A H_2SO_4 **B** SO_4^{2-} **C** H_3O^+ **D** OH^-

/1

Answer ☐ [1]

Learners' Alley, Acids, Bases and Salts slides

4 Which pair of substances could be mixed to make barium sulfate by precipitation?

A $Ba(NO_3)_2(aq)$ and $Na_2SO_4(aq)$

B $BaCO_3(s)$ and $Na_2SO_4(aq)$

C $BaCl_2(aq)$ and $NaNO_3(aq)$

D $Ba(NO_3)_2(aq)$ and $NaCl(aq)$

/1

Answer ☐ [1]

Learners' Alley, Acids, Bases and Salts slides

5 25.0 cm^3 of aqueous sodium hydroxide is neutralised by 20.0 cm^3 of 0.100 mol dm^{-3} sulfuric acid. What is the concentration of the sodium hydroxide?

A 0.0400 mol dm^{-3} **B** 0.0800 mol dm^{-3} **C** 0.160 mol dm^{-3} **D** 0.200 mol dm^{-3}

/1

Answer ☐ [1]

Learners' Alley, Acids, Bases and Salts slides

6 **(a)** Name the salt and the gas formed when zinc reacts with dilute hydrochloric acid.

.....

[1]

(b) Why does solid citric acid not conduct electricity, while its solution in water does?

.....

.....

[1]

/2

Learners' Alley, Acids, Bases and Salts slides

7 Write the balanced equation, with state symbols, for magnesium hydroxide reacting with hydrochloric acid.

.....

[1]

/1

Learners' Alley, Acids, Bases and Salts slides

8 Is every base an alkali? Explain.

.....

.....

[1]

/1

Learners' Alley, Acids, Bases and Salts slides

9 **(a)** Solution P has pH 2 and solution Q has pH 5. How many times greater is the concentration of H^+ in P?

.....

[1]

(b) What colour is methyl orange in a solution of pH 9?

.....

[1]

/2

Learners' Alley, Acids, Bases and Salts slides

10 **(a)** Give the conjugate base of H_2SO_4.

.....

[1]

(b) Give the conjugate acid of NH_3.

.....

[1]

/2

Learners' Alley, Acids, Bases and Salts slides

11 In $HCl(g) + NH_3(g) \rightarrow NH_4Cl(s)$:

(a) which reactant is the Brønsted–Lowry acid?

.....

[1]

(b) why is this not an acid–base reaction in the Arrhenius sense?

.....

.....

[1]

/2

Learners' Alley, Acids, Bases and Salts slides

12 Suggest starting materials and a method to make each salt.

(a) copper(II) sulfate

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.....

[1]

(b) potassium nitrate

.....

.....

[1]

(c) silver chloride

.....

.....

[1]

/3

Learners' Alley, Acids, Bases and Salts slides

13 25.0 cm^3 of aqueous sodium hydroxide is neutralised by 15.00 cm^3 of 0.250 mol dm^{-3} hydrochloric acid. Find the concentration of the sodium hydroxide.

[2]

/2

Learners' Alley, Acids, Bases and Salts slides

14 Which indicator would you use to titrate aqueous ammonia with hydrochloric acid? Explain.

.....

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[2]

/2

Learners' Alley, Acids, Bases and Salts slides

15 2.50 g of impure $CaCO_3$ is added to 50.0 cm^3 of 1.00 mol dm^{-3} HCl (excess). The leftover acid needs 20.0 cm^3 of 0.500 mol dm^{-3} NaOH. Find the percentage of $CaCO_3$ in the sample (M_r 100.1).

/3

[3]

Learners' Alley, Acids, Bases and Salts slides

B Practice

17 MARKS

16 Which statement about acids and bases is correct?

A All strong acids react with carbonates but all weak acids do not.

B The oxides of Group 1 metals are amphoteric.

C The pH of 1.0 mol/dm^3 ethanoic acid, CH_3COOH, is higher than the pH of 1.0 mol/dm^3 sulfuric acid, H_2SO_4.

D The pH of 1.0 mol/dm^3 nitric acid, HNO_3, is lower than the pH of 1.0 mol/dm^3 hydrochloric acid, HCl.

/1

Answer ☐ [1]

2024 Woodlands O Prelim P1 Q12

17 The table contains data about two acids.

acid	concentration / mol/dm^3	pH
hydrochloric acid	0.1	1.0
ethanoic acid	0.1	3.7

Which statement best explains the difference in pH values?

A Ethanoic acid contains carbon, hydrogen and oxygen.

B Ethanoic acid has larger molecules.

C Hydrochloric acid partially ionises.

D Hydrochloric acid releases more H^+ ions in water.

/1

Answer ☐ [1]

2024 BGSS O Prelim P2 Q15

18 Samples of HCl(aq) and HNO_3(aq) are tested using Universal Indicator. The sample of HCl(aq) has a pH of 4 and the sample of HNO_3(aq) has a pH of 2. Which statement explains why the samples have different pH values?

A HCl(aq) is a weak acid and HNO_3(aq) is a strong acid.

B HNO_3(aq) has a higher relative molecular mass than HCl(aq).

C The sample of HCl(aq) has ionised more than the sample of HNO_3(aq).

D The sample of HNO_3(aq) is more concentrated than the sample of HCl(aq).

/1

Answer ☐ [1]

2024 CHS O Prelim P1 Q21

19 The pH of four solutions of the same concentration is measured using a pH meter.

solution	hydrochloric acid	sulfuric acid	ethanoic acid	sodium hydroxide
pH	W	X	Y	Z

Which shows the correct order of the pH values?

A X < W < Y < Z **B** Y < X < W < Z **C** Z < Y < W < X **D** Z < Y < X < W

/1

Answer [1]

2023 CGSS O Prelim P1 Q22

20 An aqueous solution has a pH value of 13. What information does this give about the ions present in the solution?

	concentration of H^+ ions	concentration of OH^- ions
A	high	low
B	high	high
C	low	high
D	none	high

A row A **B** row B **C** row C **D** row D

/1

Answer [1]

2024 Compassvale O Prelim P1 Q17

21 A few drops of Universal Indicator are added to solutions X and Y.

solution	colour of Universal Indicator
X	red
Y	yellow

Which conclusion is correct?

A Solution X is acidic while solution Y is alkaline.

B Solution X is more alkaline than solution Y.

C Solution X reacts with zinc to give hydrogen gas while solution Y does not react with zinc.

D The concentration of hydrogen ions in X is higher than in solution Y.

/1

Answer [1]

2024 Zhonghua O Prelim P1 Q19

22 The following statements about dilute sulfuric acid are all correct.

1 A white precipitate is formed when aqueous barium chloride is added.
2 The solution turns anhydrous copper(II) sulfate from white to blue.
3 Addition of Universal Indicator shows that the solution has a pH value of less than 7.0.
4 The solution reacts with copper(II) oxide, forming a blue solution.

Which statements confirm the acidic nature of the solution?

A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

/1

Answer [1]

2024 BLSS O Prelim P1 Q15

23 Which statements about oxides are correct?

1 An aqueous solution of sulfur dioxide has a pH less than 7.
2 An aqueous solution of potassium oxide turns blue litmus paper red.
3 Carbon dioxide reacts with ammonia to make a salt.
4 Carbon monoxide reacts with hydrochloric acid to make a salt.

A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 3 and 4

/1

Answer [1]

2024 QTSS O Prelim P1 Q15

24 Which oxide is insoluble in aqueous sodium hydroxide?

A Al_2O_3 **B** MgO **C** P_4O_{10} **D** SO_2

/1

Answer [1]

2024 SCSS O Prelim P1 Q16

25 A solid nitrate fertiliser reacts with an alkali to produce a gas which turns damp red litmus paper blue. What is the empirical formula of this fertiliser?

A NO_3 **B** NHO_3 **C** NH_2O **D** $N_2H_4O_3$

/1

Answer [1]

2023 CGSS O Prelim P1 Q12

26 Which mixture can be separated into its components by adding water, stirring and filtering?

A calcium carbonate and sodium chloride
B magnesium and iron
C sodium chloride and copper(II) sulfate
D sulfuric acid and hydrochloric acid

/1

Answer [1]

Source: 2024 BLSS O Prelim P1 Q4

27 A student accidentally mixed 50 cm^3 of oil and 5 g of solid calcium nitrate. Which sequence of procedures would allow him to obtain a pure sample of solid calcium nitrate most easily?

A dissolve in ethanol, then filtration, then crystallisation
B dissolve in water, then filtration
C dissolve in water, then separating funnel, then crystallisation
D simple distillation, then crystallisation

/1

Answer [1]

Source: 2024 NASS O Prelim P1-P2 Q2

28 Which sequence of procedures is used to separate a pure, dry sample of hydrated copper(II) sulfate, $CuSO_4.5H_2O$, from a mixture containing hydrated copper(II) sulfate and calcium carbonate, $CaCO_3$?

A dissolve in water → distillation → crystallisation

B dissolve in water → filtration → crystallisation

C distillation → crystallisation → heating to remove all water

D fractional distillation → filtration → heating to remove all water

/1

Answer [1]

Source: 2025 CCHY O Prelim P1 Q3

29 Which method is most suitable for preparing magnesium nitrate?

A Add excess nitric acid to magnesium oxide. Filter and crystallise the filtrate.

B Add excess magnesium carbonate to nitric acid. Filter and crystallise the filtrate.

C Add equal volumes of 0.1 mol/dm^3 magnesium hydroxide and 0.1 mol/dm^3 nitric acid together.

D Add equal volumes of aqueous magnesium chloride and aqueous sodium nitrate together and filter.

/1

Answer [1]

2024 Whitley O Prelim P1 Q20

30 Which method of preparation is suitable for making these salts?

	titration	metal + acid	metal carbonate + acid	precipitation
A	potassium nitrate	silver chloride	copper(II) sulfate	zinc sulfate
B	potassium nitrate	zinc sulfate	copper(II) sulfate	silver chloride
C	zinc sulfate	sodium nitrate	silver chloride	copper(II) sulfate
D	zinc sulfate	copper(II) sulfate	potassium nitrate	silver chloride

A row A **B** row B **C** row C **D** row D

/1

Answer [1]

2025 CCHY O Prelim P1 Q21

31 Which three salts are all prepared by precipitation?

A barium sulfate, calcium nitrate, silver chloride

B barium sulfate, lead(II) chloride, silver nitrate

C calcium sulfate, lead(II) sulfate, silver chloride

D calcium sulfate, lead(II) sulfate, silver nitrate

/1

Answer [1]

2024 YSS O Prelim P1 Q18

32 30 cm^3 of 0.1 mol/dm^3 aqueous sodium hydroxide is required to exactly neutralise 25 cm^3 of dilute sulfuric acid. What is the concentration of the acid?

A 0.24 mol/dm^3 **B** 0.12 mol/dm^3 **C** 0.06 mol/dm^3 **D** 0.03 mol/dm^3

/1

Answer [1]

2024 CCHM O Prelim P1 Q16

10 The Periodic Table of Elements

Group																	
1	2											13	14	15	16	17	18
							1 H hydrogen 1.0										2 He helium 4.0
3 Li lithium 6.9	4 Be beryllium 9.0		**Key** atomic number atomic symbol name relative atomic mass									5 B boron 10.8	6 C carbon 12.0	7 N nitrogen 14.0	8 O oxygen 16.0	9 F fluorine 19.0	10 Ne neon 20.2
11 Na sodium 23.0	12 Mg magnesium 24.3	3	4	5	6	7	8	9	10	11	12	13 Al aluminium 27.0	14 Si silicon 28.1	15 P phosphorus 31.0	16 S sulfur 32.1	17 Cl chlorine 35.5	18 Ar argon 39.9
19 K potassium 39.1	20 Ca calcium 40.1	21 Sc scandium 45.0	22 Ti titanium 47.9	23 V vanadium 50.9	24 Cr chromium 52.0	25 Mn manganese 54.9	26 Fe iron 55.8	27 Co cobalt 58.9	28 Ni nickel 58.7	29 Cu copper 63.5	30 Zn zinc 65.4	31 Ga gallium 69.7	32 Ge germanium 72.6	33 As arsenic 74.9	34 Se selenium 79.0	35 Br bromine 79.9	36 Kr krypton 83.8
37 Rb rubidium 85.5	38 Sr strontium 87.6	39 Y yttrium 88.9	40 Zr zirconium 91.2	41 Nb niobium 92.9	42 Mo molybdenum 95.9	43 Tc technetium –	44 Ru ruthenium 101.1	45 Rh rhodium 102.9	46 Pd palladium 106.4	47 Ag silver 107.9	48 Cd cadmium 112.4	49 In indium 114.8	50 Sn tin 118.7	51 Sb antimony 121.8	52 Te tellurium 127.6	53 I iodine 126.9	54 Xe xenon 131.3
55 Cs caesium 132.9	56 Ba barium 137.3	57–71 lanthanoids	72 Hf hafnium 178.5	73 Ta tantalum 180.9	74 W tungsten 183.8	75 Re rhenium 186.2	76 Os osmium 190.2	77 Ir iridium 192.2	78 Pt platinum 195.1	79 Au gold 197.0	80 Hg mercury 200.6	81 Tl thallium 204.4	82 Pb lead 207.2	83 Bi bismuth 209.0	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

lanthanoids	57 La lanthanum 138.9	58 Ce cerium 140.1	59 Pr praseodymium 140.9	60 Nd neodymium 144.2	61 Pm promethium –	62 Sm samarium 150.4	63 Eu europium 152.0	64 Gd gadolinium 157.3	65 Tb terbium 158.9	66 Dy dysprosium 162.5	67 Ho holmium 164.9	68 Er erbium 167.3	69 Tm thulium 168.9	70 Yb ytterbium 173.1	71 Lu lutetium 175.0
actinoids	89 Ac actinium –	90 Th thorium 232.0	91 Pa protactinium 231.0	92 U uranium 238.0	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –