

ST JOSEPH'S INSTITUTION

END-OF-YEAR EXAMINATION 2020 (YEAR 3)

CANDIDATE NAME		
CLASS	INDEX NUMBER	

CHEMISTRY	6092 / 01					
Paper 1 Multiple Choice	8 OCTOBER 2020					
Additional Materials:	45 minutes					
Multiple Choice Answer Sheet	(0800 - 0845)					

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on the cover page of this Question Paper. Write in soft pencil. Do not use staples, paper clips, glue or correction fluid.

There are **thirty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.

Choose the one you consider correct and record your choice in soft pencil on the separate Answer Sheet.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Any rough working should be done on this question paper.

The use of an approved scientific calculator is expected, where appropriate.

A copy of the Periodic Table is printed on page 2.

<u> </u>	_				_			_	_						_			_	_													
	0	2	He	4	10	Ne	neon	20	18	Ar	argon 40	36	K	krypton 84	54	×e	xenon	131	86	Rn	radon					11	Lu	lutetium	175	103	2	lawrencium -
	NII				6	LL.	fluorine	19	17	CI	chlorine 35.5	35	Ъ	bromine RD	53	I	iodine	127	85	At	astatine					10	γb	ytterbium	173	102	^o N	nobelium
	M				8	0	oxygen	16	16	S	sulfur 32	34	Se	selenium 70	52	Te	tellurium	128	84	P	polonium		116	LV		69	Tm	thulium	169	101	Md	mendelevium -
	>				7	z	nitrogen	14	15	٩	phosphorus 31	33	As	arsenic 75	51	Sb	antimony	122	83	ö	bismuth	RNZ				68	ш	erbium	167	100	Ē	fermium -
	N				9	U	carbon	12	14	Si	silicon 28	32	Ge	germanium 73	50	Sn	ţ	119	82	Pp	lead	107	114	H/		67	£	holmium	165	66	ш	einsteinium -
	=				5	B	boron	11	13	AI	aluminium 27	31	Ga	gallium	49	IJ	indium	115	81	11	thallium	504				99	Ŋ	dysprosium	163	98	5	californium
												30	Zn	zinc 65	48	D	cadmium	112	80	ВН	mercury	107	112	Cu		65	4 L	terbium	159	67	¥	berkelium -
												29	Cu	copper 64	47	Ag	silver	108	19	Au	gold	181	111	Rg	-	64	BG	gadolinium	157	96	E O	curium
dno												28	ïZ	nickel 50	46	Pd	palladium	106	78	£	platinum	130	110	Ds	damstadtum	63	Ш	europium	152	95	Am	americium
Gre		7.										27	റ	cobalt 50	45	Rh	rhodium	103	11	L	100	761	109	MI		62	Sm	samarium	150	94	Ъ	plutonium
		1	H	1 Internet								26	Fe	Iron Fi6	44	Ru	ruthenium	101	91	So	osmium	190	108	HS		61	Pm	promethium	ı	93	dN	neptunium
		8										25	Mn	manganese	43	Tc	technetium	-	75	Re	1 oc	001	101	Bh		60	PN	neodymium	144	92		D38
					umber	loo		mass				24	ວັ	chromium 50	42	Mo	molybdenum	96	74	N	tungsten	+01	106	Sg	seaborgium –	59	۲,	praseodymium	141	91	Pa	protactinium 231
				Key	(atomic) n	omic sym	name	ve atomic				23	>	vanadium 51	41	qN	niobium	93	73	Ta	tantalum 101	101	105	UD minter	-	58	e	cerium	140	06	F	232
					proton	atc	100	relati				22	F	titanium 48	40	Zr	zirconium	91	72	Ŧ	170	0/1	104	R		22	La	lanthanum	139	89	Ac	actinium
												21	Sc	scandium 45	39	7	yttrium	89	57-71	lanthanoids		001 00	89 - 103 actinoide	acunoius		S						
	=				4	Be	beryllium	6	12	Mg	magnesium 24	20	Ca	calcium 40	38	ы С	strontium	88	56	Ba	4 2 7	100	88	Ka	Ladium	anthanoid				actinoids		
	_				3		lithium	7	11	Na	23	19	×	potassium 30	37	Rb	rubidium	85	55	S	4.2.2	201	18	F	Trancium							

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

The Periodic Table of Elements

1 The diagram shows a beaker filled with hydrogen gas inverted over a porous pot containing carbon monoxide.



The water level on the right hand side of the U-tube moves. Which of the following statements is **not** true?

- A Hydrogen diffuses into the pot faster than carbon monoxide diffuses out of the pot.
- **B** The pressure in the pot increases and then decreases.
- **C** The water level goes back to the original level at the end of the experiment.
- **D** The water level on the right hand side of the U-tube drops and then rises.

- 2 A beaker of pure water has been boiling for 20 minutes. Which of the following diagrams represents the particles present in the bubbles inside the boiling water?
 - A B C D
 - \bigcirc represents a hydrogen atom and ullet represents an oxygen atom

3 The boiling points of some elements are given in the table.

element	boiling point / °C
X	-138
Y	-155
Z	-143

A mixture of elements **X**, **Y** and **Z** is heated from -162 $^{\circ}$ C to -142 $^{\circ}$ C. Which of the elements would remain in the liquid state at -142 $^{\circ}$ C?

- A X only
- **B** X and Y only
- C Y and Z only
- **D X**, **Y** and **Z**

- 4 Zinc sulfate can be separated from chalk using four processes. Which is the correct order for separation to take place?
 - A dissolving, evaporation, crystallisation, filtration
 - B dissolving, filtration, evaporation, crystallisation
 - **C** filtration, crystallisation, evaporation, dissolving
 - D filtration, evaporation, crystallisation, dissolving
- **5** Which condition must be satisfied for separation of substances to occur in paper chromatography?
 - **A** The mixture contains substances of the same R_f value.
 - **B** The mixture must be placed so that the spot is on the solvent line.
 - **C** The mixture must be soluble in the solvent.
 - **D** The mixture must contain substances that have different boiling points.
- 6 If a 10 cm³ pipette were not available, which one of the following procedures would you use to measure a 10 cm³ portion of a solution for an accurate titration?
 - A measure 10 cm³ from a beaker
 - **B** measure 10 cm³ from a burette
 - **C** measure 10 cm³ from a measuring cylinder
 - **D** measure 20 cm³ from a pipette and divide the solution into two equal parts

7 The graph gives the melting points of mixtures of lead and tin.



Which statement is not correct?

- A All mixtures of lead and tin have lower melting points than both pure lead and pure tin.
- **B** Pure lead has a higher melting point than pure tin.
- **C** The addition of lead to tin lowers its melting point.
- **D** The addition of tin to lead lowers its melting point.

8 The diagrams show the spacing of molecules in a substance at atmospheric pressure but at two different temperatures.



Which substance could the diagrams represent?

substance	melting point / °C	boiling point / °C
Α	-183	-89
В	-182	-162
С	-169	-104
D	-114	-85

9 The diagrams show the nuclei of five different atoms.



Which two atoms are isotopes of the same element?

- A atoms 1 & 2
- **B** atoms 2 & 3
- **C** atoms 3 & 4
- **D** atoms 4 & 5

10 An ion **X**²⁺ contains 19 neutrons and 18 electrons. Which of the following shows the proton number and nucleon number of **X** correctly?

	proton number	nucleon number
Α	16	35
В	18	37
С	19	38
D	20	39

11 The elements X and Y form the compound XY₂. The compound does not conduct electricity in the solid and molten state.

What is the correct electron arrangement of the atoms X and Y?

	atom of X	atom of Y
Α	2,1	2,6
В	2,2	2,7
С	2,6	2,7
D	2,7	2,6

- **12** Which substance contains both ionic and covalent bonds?
 - A calcium sulfate
 - B nitrogen dioxide
 - **C** phosphorus trichloride
 - **D** sodium bromide

- **13** Which statement best explains why calcium oxide has a higher melting point than sodium oxide?
 - **A** The covalent bonds in calcium oxide are stronger than the ionic bonds in sodium oxide.
 - **B** The electrostatic forces of attraction in calcium oxide are stronger than that in sodium oxide.
 - **C** The intermolecular forces of attraction in calcium oxide are stronger than that in sodium oxide.
 - **D** The metallic bonds in calcium oxide are stronger than that in sodium oxide.

substance	X	Y
melting point / °C	high	low
solubility in water	soluble	soluble
solubility in	insoluble	soluble
organic solvent		3010010
electrical	Conducts only in molten	Conducts only in
conductivity	and aqueous state	aqueous state

14 The table below shows the properties of substances X and Y.

Which of the following options indicates the identity of X and Y correctly?

	X	Y
Α	copper	hydrogen chloride
В	graphite	sodium oxide
С	sodium	silicon
D	sodium chloride	sulfur dioxide

15 A sample of nitrogen, of mass 5.00 g is completely converted into an oxide of nitrogen. The mass of the oxide formed is 19.30 g.

What is the empirical formula of the oxide?

- A NO
- B NO₂
- **C** N₂O₃
- $\boldsymbol{D} \qquad N_2O_5$
- **16** 20.0 cm³ of 0.100 mol/dm³ potassium hydroxide is completely reacted with 20.0 cm³ of sulfuric acid solution.

What is the concentration of potassium ions in the **resultant** solution?

- A 0.050 mol/dm³
- **B** 0.100 mol/dm³
- **C** 0.250 mol/dm³
- **D** 0.300 mol/dm³
- **17** Carbon monoxide can react with oxygen to form carbon dioxide as shown in the equation below:

$$2CO(g) + O_2(g) \rightarrow 2CO_2(g)$$

In this reaction, 3 moles of carbon monoxide and 2 moles of oxygen are mixed. When the reaction is complete, there will be

- A 0.5 mole of oxygen unreacted.
- **B** 1 mole of carbon monoxide unreacted.
- **C** 2 moles of carbon dioxide produced.
- **D** 4 moles of carbon dioxide produced.

18 The main ore of zinc is zinc blende, which is mainly zinc sulfide, ZnS. When zinc blende is burnt in air, the following reaction takes place:

 $2ZnS(s) + 3O_2(g) \rightarrow 2ZnO(s) + 2SO_2(g)$

194 g of impure zinc blende sample is burnt in excess oxygen to produce 43.2 dm³ of sulfur dioxide. What is the percentage purity of zinc sulfide in the sample?

- **A** 80.0 %
- **B** 85.0 %
- **C** 90.0 %
- **D** 95.0 %
- **19** Three substances were added separately to aqueous potassium sulfate and aqueous potassium carbonate. The three substances were
 - 1 aqueous ammonia
 - 2 barium nitrate solution
 - 3 dilute hydrochloric acid

Which substance(s) would give different observations upon addition?

- A 1 only
- **B** 3 only
- **C** 1 and 2
- **D** 2 and 3

- **20** There are two unlabelled test tubes. One contains aqueous ammonium nitrate while the other contains aqueous sodium nitrate. Which test could identify the solutions?
 - A add aqueous ammonia and warm
 - **B** add aqueous sodium hydroxide and warm
 - **C** add aqueous sodium hydroxide, aluminium foil and warm
 - D add dilute hydrochloric acid and warm
 - 21 Which of the following sets of aqueous solutions will form only a colourless solution when mixed together in the same conical flask?
 - A NaOH, FeC/₃, NaC/
 - **B** Ba(NO₃)₂, K₂SO₄, H₂SO₄
 - C CuSO₄, KC*I*, H₂SO₄
 - **D** KNO₃, NaOH, Na₂SO₄
 - 22 A farmer adds ammonium nitrate to the soil to increase its nitrogen content. He then proceeds to add calcium hydroxide in order to neutralise the excess acid in the soil.

Why is this not a good idea?

- A Calcium hydroxide will cause the soil to become excessively alkaline.
- **B** Calcium hydroxide will react with ammonium nitrate to release ammonia gas.
- **C** Calcium hydroxide will react with ammonium nitrate to form calcium nitrate.
- **D** Calcium hydroxide will make ammonium nitrate insoluble in water.

- Dilute nitric acid has a pH of 1.Which substance(s) will affect the pH of the acid when added to it?
 - 1 zinc metal
 - 2 zinc chloride solution
 - 3 zinc nitrate solution
 - A 1 only
 - B 3 only
 - **C** 1 and 2 only
 - **D** 1 and 3 only
- **24** The table shows information about three indicators.

indicator	colour at pH 1	pH at which colour changes	colour at pH 12
thymol blue	red	3	yellow
congo red	blue	5	red
phenolphthalein	colourless	10	pink

The following colours are observed when an aqueous solution **X** is added to each of the indicators separately.

thymol blue	congo red	phenolphthalein
yellow	red	pink

Which statement describes aqueous solution X correctly?

- A The pH of X is at least 10.
- **B** X could be aqueous sodium chloride.
- **C X** could be pure water.
- **D X** is an alkaline.

25 The reactions of four different oxides **W**, **X**, **Y** and **Z** with hydrochloric acid and sodium hydroxide solution are shown.

	hydrochloric acid	sodium hydroxide
W	\checkmark	Х
Х		
Y	Х	Х
Ζ	Х	

 $(\sqrt{)}$ means there is a reaction and (X) means there is no reaction.

Which row shows the correct types of oxide?

	W	Х	Y	Z
Α	acidic	amphoteric	neutral	basic
В	amphoteric	acidic	basic	neutral
С	basic	amphoteric	neutral	acidic
D	neutral	basic	amphoteric	acidic

26 Dilute sulfuric acid was added to aqueous barium hydroxide until the acid was in excess.

Which graph best represents the variation in the total number of mobile ions in the solution?



27 Francium is a Group I element.

Using **only** this information, what can be deduced about francium?

- A It has a high melting point.
- **B** It forms coloured compounds.
- **C** It is a more reactive metal than sodium.
- **D** It is denser than water.
- **28** The diagram shows the position of elements **W**, **X**, **Y** and **Z** in the Periodic Table.

These letters are not the chemical symbols of the elements.



Which statement is **not** correct?

- **A W** and **Z** could react together to form a compound **WZ**.
- **B W** has a melting point that is lower than that of **Z**.
- **C X** could form an oxide X_2O_3 .
- **D Y** could form an oxide **YO**₂.

29 Elements **X** and **Y** are in Group VII of the Periodic Table. **X** is a liquid at room temperature. **Y** is a solid at room temperature.

Which statement(s) is/are correct?

- 1 Element **Y** has more protons than element **X**.
- 2 Molecules of **Y** have more atoms than molecules of **X**.
- 3 Y displaces X from aqueous solution of X to form aqueous solution of Y.
 - A 1 only
 - B 2 only
 - C 3 only
 - **D** 1, 2 and 3
- 30 X, Y and Z represents different halogens. The table below shows the results of nine experiments in which aqueous solutions of X₂, Y₂ and Z₂ were separately added to aqueous solutions containing X⁻, Y⁻ and Z⁻.

	X ⁻ (aq)	Y⁻(aq)	Z⁻(aq)
X₂(aq)		no reaction	no reaction
Y ₂ (aq)	X ₂ formed		Z ₂ formed
Z ₂ (aq)	X ₂ formed	no reaction	

Which row identifies the halogens correctly?

	X	Y	Z
Α	bromine	chlorine	iodine
В	chlorine	bromine	iodine
С	iodine	chlorine	bromine
D	iodine	bromine	chlorine