AQA

A Level Chemistry

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Summer Work

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Please complete the activities in this booklet and hand in during your first Chemistry lesson in September

SIR WILLIAM ROBERTSON ACADEMY

iii *Engage in wider reading*

University of Cambridge Chemistry Department youtube page

University of Oxford Chemistry Department youtube page

A Day in the life of an undergraduate chemistry student

TED Talks on Chemistry

Variety of articles on recent uses of chemistry

Ionic Formulae

1 Polyatomic Ions

Watch

https://www.youtube.com/watch?v=gTvwmlH7zLk

Create

Create a flashcard for each polyatomic ion in the table below including name, formula and charge. Make sure you review these regularly

Common Polyatomic Ions			
Ion	Name	Ion	Name
NH_4^+	Ammonium	CO_3^{2-}	Carbonate
NO_2^-	Nitrite	HCO_3^-	Hydrogen carbonate Or Bicarbonate
NO_3^-	Nitrate	ClO^-	Hypochlorite
SO_3^{2-}	Sulfite	ClO_2^-	Chlorite
SO_4^{2-}	Sulfate	ClO_3^-	Chlorate
HSO_4^-	Hydrogen sulfate Or Bisulfate	ClO_4^-	Perchlorate
OH^-	Hydroxide	$C_2H_3O_2^-$	Acetate
CN^-	Cyanide	MnO_4^-	Permanganate
PO_4^{3-}	Phosphate	$Cr_2O_7^{2-}$	Dichromate
HPO_4^{2-}	Hydrogen phosphate	CrO_4^{2-}	Chromate
$H_2PO_4^{2-}$	Dihydrogen phosphate	O_2^{2-}	Peroxide

2 Determining Ionic Formulae

Watch

https://youtu.be/ct_7qhxh6JE

https://www.youtube.com/watch?v=iQEGrX5Ud6g

Practice

1	a)	sodium iodide	.....	**2**	a)	sodium sulfate	.....
	b)	potassium oxide	.....		b)	calcium sulfate	.....
	c)	aluminium chloride	.....		c)	magnesium hydroxide	.....
	d)	magnesium bromide	.....		d)	zinc(II) nitrate	.....
	e)	aluminium oxide	.....		e)	copper(II) carbonate	.....
	f)	iron(II) oxide	.....		f)	sodium hydroxide	.....
	g)	iron(III) oxide	.....		g)	potassium carbonate	.....
	h)	magnesium sulfide	.....		h)	iron(III) hydroxide	.....
	i)	copper(II) fluoride	.....		i)	ammonium nitrate	.....
	j)	lithium iodide	.....		j)	ammonium hydroxide	.....
	k)	barium bromide	.....		k)	iron(III) sulfate	.....
	l)	zinc(II) sulfide	.....		l)	aluminium nitrate	.....
	m)	lead(II) iodide	.....		m)	silver(I) nitrate	.....
	n)	iron(III) sulfide	.....		n)	calcium carbonate	.....
	o)	magnesium oxide	.....		o)	magnesium nitrate	.....
	p)	rubidium bromide	.....		p)	ammonium astatide	.....
	q)	strontium chloride	.....		q)	caesium nitrate	.....
	r)	caesium selenide	.....		r)	strontium hydroxide	.....
	s)	calcium astatide	.....		s)	platinum(II) nitrate	.....
	t)	radium polonide	.....		t)	cobalt(II) carbonate	.....
	u)	gallium fluoride	.....		u)	copper(I) oxide	.....
	v)	scandium(III) bromide	.....		v)	copper(II) oxide	.....
	w)	chromium(III) oxide	.....		w)	francium telluride	.....
	x)	strontium iodide	.....		x)	gold(I) fluoride	.....
	y)	lithium arsenide	.....		y)	rubidium sulfate	.....

★★☆ Review

Turn to the back of the booklet and mark your answers on the previous page

Score: / 50

Check

Log on to the Quizlet below and attempt the questions

https://quizlet.com/207566438/ionic-formula-flash-cards/

Score: / 56

Balancing Equations

Watch

https://www.youtube.com/watch?v=jy6F0Lbvjm8

https://www.youtube.com/watch?v=qquOFYOpdl0

Practice

1) $Na + H_2O \rightarrow NaOH + H_2$

2) $KOH + H_2SO_4 \rightarrow K_2SO_4 + H_2O$

3) $Mg(NO_3)_2 + NaOH \rightarrow Mg(OH)_2 + NaNO_3$

4) $NO + H_2O + O_2 \rightarrow HNO_3$

5) $C_5H_{12} + O_2 \rightarrow CO_2 + H_2O$

6) $Br_2 + NaI \rightarrow NaBr + I_2$

7) $K_2CO_3 + HNO_3 \rightarrow KNO_3 + CO_2 + H_2O$

8) $NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$

9) $ZnCO_3 \rightarrow ZnO + CO_2$

★★☆ Review

Turn to the back of the booklet and mark your answers on the previous page

Score: / 9

Check

Log on to the quiz below and attempt the questions

https://www.educationquizzes.com/gcse/chemistry/balancing-symbol-equations-h/

Score: / 10

1 Calculating Formula Mass

Watch

https://www.youtube.com/watch?v=it_fMQu5ivg

Practice

1 F_2

2 Fe

3 H_2SO_4

4 Al_2O_3

5 $Mg(OH)_2$

6 $Al(NO_3)_3$

7 $(NH_4)_2SO_4$

8 $CuCO_3$

9 $AgNO_3$

10 NH_4NO_3

★★☆

Review

Turn to the back of the booklet and mark your answers

Score: / 10

(2) Mole Calculations

Watch

https://www.youtube.com/watch?v=wPGVQu3UXpw

Practice

1) Calculate the number of moles of each of the following substances. Give your answers to 3 sig figs.

a) 90.0 g of H_2O .....

b) 20.0 g of C_4H_{10} .....

c) 685 g of NH_3 .....

d) 102 tons of O_2 .....

e) 2.00 kg of Al_2O_3 .....

f) 20.6 mg of Au .....

2) Calculate the mass of each of the following substances. Give your answers to 3 sig figs.

a) 4.00 moles of N_2 .....

b) 0.100 moles of HNO_3 .....

c) 0.0200 moles of K_2O .....

d) 2.50 moles of PH_3 .....

e) 0.400 moles of C_2H_5OH .....

f) 10.0 moles of $Ca(OH)_2$ .....

★★☆ Review

Turn to the back of the booklet and mark your answers

Score: / 12

Answers

(1) Ionic Formulae (*page 9)*

1

a) NaI
b) K_2O
c) $AlCl_3$
d) $MgBr_2$
e) Al_2O_3
f) FeO
g) Fe_2O_3
h) MgS
i) CuF_2
j) LiI
k) $BaBr_2$
l) ZnS
m) PbI_2
n) Fe_2S_3
o) MgO
p) RbBr
q) $SrCl_2$
r) CsSe
s) $CaAt_2$
t) RaPo
u) GaF_3
v) $ScBr_3$
w) Cr_2O_3
x) SrI_2
y) Li_3As

2

a) Na_2SO_4
b) $CaSO_4$
c) $Mg(OH)_2$
d) $Zn(NO_3)_2$
e) $CuCO_3$
f) NaOH
g) K_2CO_3
h) $Fe(OH)_3$
i) NH_4NO_3
j) NH_4OH
k) $Fe_2(SO_4)_3$
l) $Al(NO_3)_3$
m) $AgNO_3$
n) $CaCO_3$
o) $Mg(NO_3)_2$
p) NH_4At
q) $CsNO_3$
r) $Sr(OH)_2$
s) $Pt(NO_3)_2$
t) $CoCO_3$
u) Cu_2O
v) CuO
w) Fr_2Te
x) AuF
y) Rb_2SO_4

② Balancing Equations (*page 11*)

1) $2\ Na + 2\ H_2O \rightarrow 2\ NaOH + H_2$

2) $2\ KOH + H_2SO_4 \rightarrow K_2SO_4 + 2\ H_2O$

3) $Mg(NO_3)_2 + 2\ NaOH \rightarrow Mg(OH)_2 + 2\ NaNO_3$

4) $4\ NO + 2\ H_2O + 3\ O_2 \rightarrow 4\ HNO_3$

5) $C_5H_{12} + 8\ O_2 \rightarrow 5\ CO_2 + 6\ H_2O$

6) $Br_2 + 2\ NaI \rightarrow 2\ NaBr + I_2$

7) $K_2CO_3 + 2\ HNO_3 \rightarrow 2\ KNO_3 + CO_2 + H_2O$

8) $2\ NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$

9) $ZnCO_3 \rightarrow ZnO + CO_2$

3 Formula Mass Calculations (*page 14*)

1	F_2	2(19)	= 38
2	Fe		= 56
3	H_2SO_4	2(1) + 32 + 4(16)	= 98
4	Al_2O_3	2(27) + 3(16)	= 102
5	$Mg(OH)_2$	24 + 2(16) + 2(1)	= 58
6	$Al(NO_3)_3$	27 + 3(14) + 9(16)	= 213
7	$(NH_4)_2SO_4$	2(14) + 8(1) + 32 + 4(16)	= 132
8	$CuCO_3$	63.5 + 12 + 3(16)	= 123.5
9	$AgNO_3$	108 + 14 + 3(16)	= 170
10	NH_4NO_3	14 + 4(1) + 14 + 3(16)	= 80

4 Mole Calculations (*page 15*)

1) Calculate the number of moles of each of the following substances. Give your answers to 3 significant figures.

a) 90.0 g of H_2O — $\frac{90.0}{18} = 5.00$

b) 20.0 g of C_4H_{10} — $\frac{20.0}{58} = 0.345$

c) 685 g of NH_3 — $\frac{685}{17} = 40.3$

d) 102 tons of O_2 — $\frac{102000000}{32} = 3190000\ (3.19 \times 10^6)$

e) 2.00 kg of Al_2O_3 — $\frac{2000}{102} = 19.6$

f) 20.6 mg of Au — $\frac{0.0206}{197} = 0.000105\ (1.05 \times 10^{-4})$

2) Calculate the mass of each of the following substances. Give your answers to 3 significant figures.

a) 4.00 moles of N_2 — $4.00 \times 28 = 112$ g

b) 0.100 moles of HNO_3 — $0.100 \times 63 = 6.30$ g

c) 0.0200 moles of K_2O — $0.0200 \times 94 = 1.88$ g

d) 2.50 moles of PH_3 — $2.50 \times 34 = 85.0$ g

e) 0.400 moles of C_2H_5OH — $0.400 \times 46 = 18.4$ g

f) 10.0 moles of $Ca(OH)_2$ — $10.0 \times 74 = 740$ g