

Chemistry Induction Assignment 2020

Well done on choosing to study A level chemistry, you've made a wise decision. To make sure that you're ready to go we have set you a few learning tasks that we will expect you to complete and bring with you on your first lesson. **Your work should be neatly presented on A4 paper with your FULL NAME, the date and the title at the top. You will then have a short TEST on the content of this work.** Use GCSE chemistry text books (<https://goo.gl/S13b3M>) or the internet <http://goo.gl/THNWb9> to help you. **The questions are based on the AQA GCSE Chemistry syllabus**

1. A calcium atom has the formula ${}^{40}_{20}\text{Ca}$.
- How many protons, neutrons and electrons does it have?
 - What is the electron arrangement of the calcium atom?
 - What is the charge on the calcium ion if it loses 2 electrons?
 - An isotope of calcium has 11 neutrons, what is its mass number?

2. This question is about relative atomic mass.
- What is meant by relative atomic mass?
 - There are two isotopes of lithium 8% ${}^6\text{Li}$ and 92% ${}^7\text{Li}$ what is lithium's relative atomic mass?

3. **Making "flashcards" (OK done on paper).** The table below shows the formulae of some groups of atoms called **common ions** or **molecular ions**. You will be expected to **MEMORISE the formulae** and **the charge**. Make 6 little flashcards with name of formula on one side and formula on the other. **Bring these in to your first lesson.**

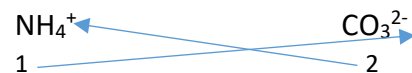
+1	-1	-2
NH_4^+ (ammonium)	OH^- (hydroxide)	SO_4^{2-} (carbonate)
	NO_3^- (nitrate)	CO_3^{2-} (carbonate)
	HCO_3^- (hydrogencarbonate)	

HINTS if suffix is ATE it contains oxygen (apart from hydroxide) "It ate oxygen".

4. **Writing chemical formula correctly.** All compounds have no overall charge. Look at the following example of how to make sure that charges cancel.

What is the formula of ammonium carbonate?

Step 1: write out formulae of ions and underneath the number of the charge



Step 2: cross the charges over

Formula is: $(\text{NH}_4)_2\text{CO}_3$

Charges have cancelled out. There are brackets around the ammonium ion as there are more than one.

Here are the formulae of some metal ions. **YOU DO NOT NEED TO MEMORISE THESE CATIONS**

+1	+2	+3
Ag^+ (silver)	Fe^{2+} (iron(II))	Al^{3+} (aluminium)
	Co^{2+} (cobalt (II))	Fe^{3+} (iron (III))
	Cu^{2+} (copper (II))	Cr^{3+} (chromium (III))

Use the tables of formulae of the ions to work out the formulae of the following compounds

(i) Copper(II) hydroxide	(ii) Iron(III)carbonate	(iii) Aluminium nitrate
(iv) iron(II)nitrate	(v) Cobalt(II)carbonate	(vi) Silver(I) sulfate

5. The following question is about the **periodic table** and bonding

hydrogen 1 H 1.008																	helium 2 He 4.008
lithium 3 Li 6.941	beryllium 4 Be 9.012											boron 5 B 10.811	carbon 6 C 12.011	nitrogen 7 N 14.007	oxygen 8 O 15.999	fluorine 9 F 18.998	neon 10 Ne 20.180
sodium 11 Na 22.990	magnesium 12 Mg 24.305											aluminium 13 Al 26.982	silicon 14 Si 28.086	phosphorus 15 P 30.974	sulfur 16 S 32.065	chlorine 17 Cl 35.453	argon 18 Ar 39.948
potassium 19 K 39.098	calcium 20 Ca 40.078	scandium 21 Sc 44.956	titanium 22 Ti 47.867	vanadium 23 V 50.942	chromium 24 Cr 51.996	manganese 25 Mn 54.938	iron 26 Fe 55.845	cobalt 27 Co 58.933	nickel 28 Ni 58.693	copper 29 Cu 63.546	zinc 30 Zn 65.38	gallium 31 Ga 69.723	germanium 32 Ge 72.61	arsenic 33 As 74.922	seleena 34 Se 78.96	bromine 35 Br 79.904	krypton 36 Kr 83.80
rubidium 37 Rb 85.468	strontium 38 Sr 87.62	yttrium 39 Y 88.906	zirconium 40 Zr 91.224	niobium 41 Nb 92.906	niobium 42 Mo 95.94	technetium 43 Tc 98	rhodium 44 Ru 101.07	rhodium 45 Rh 101.07	rhodium 46 Pd 106.42	silver 47 Ag 107.87	cadmium 48 Cd 112.41	indium 49 In 114.82	tin 50 Sn 118.71	antimony 51 Sb 121.76	tellurium 52 Te 127.60	iodine 53 I 126.90	xenon 54 Xe 131.29
caesium 55 Cs 132.91	barium 56 Ba 137.33	lanthanum 57 La 138.91	cerium 58 Ce 140.12	praseodymium 59 Pr 140.91	neodymium 60 Nd 144.24	promethium 61 Pm 145	europium 62 Eu 151.96	europium 63 Gd 157.25	europium 64 Tm 168.93	mercury 80 Hg 200.59	thallium 81 Tl 204.38	lead 82 Pb 207.2	bismuth 83 Bi 208.98	polonium 84 Po 209	astatine 85 At 210	radon 86 Rn 222	

- (i) Which metal is in group 1 period 3?
- (ii) Which non-metal is in group 6 period 2?

6. These questions are about bonding

- (i) The bond formed between the two in elements in Q5 is called an **ionic bond**, draw a dot cross diagram to show how the ions are formed. (if you cannot identify the elements use lithium and fluorine)
- (ii) When nitrogen reacts with hydrogen **covalent bonds** are formed. Use a dot cross diagram to show the bonding in NH₃ (ammonia)
- (iii) When lots of iron atoms get together they form **metallic bonds**. Use a diagram to describe the bonding between the metal atoms.
- (iv) This question is about balancing equations. In a balanced equation atoms which appear on the left hand side (reactants) also appear on the right hand side (products). Use this BBC GCSE bitesize link <http://goo.gl/OgfJg0>. It would be helpful for you if you memorise the formula of some simple acids and bases. **(Hint make flashcards)**

Acids	Hydrochloric acid HCl	Nitric acid HNO₃	Sulphuric acid H₂SO₄
Bases	Sodium hydroxide NaOH	Calcium hydroxide Ca(OH)₂	Ammonium hydroxide NH₄OH

(v) a. Balance the following simple acid base equations

- (i) NaOH + H₂SO₄ → Na₂SO₄ + H₂O
- (ii) Ca(OH)₂ + HCl → CaCl₂ + H₂O

b. Now convert these word equations into balanced equations

- (iii) Sulfuric acid reacts with ammonium hydroxide to make ammonium sulfate and water (make sure you get chemical formula correct!)
- (iv) Calcium hydroxide reacts with nitric acid to make calcium nitrate and water.
- (vi) In chemistry you will need to rearrange some simple chemical formulae. Rearrange the following to get the underlined term on its own

For example $A = B \times \underline{C}$
 $\underline{C} = A/B$

- (i) Mass = n x Mr
- (ii) n = C x V/1000
- (iii) P x V = n x R x T
- (vii) You have already done a little bit on organic chemistry. Try to answer to following questions
 - (i) What is the general formula of the alkane family?
 - (ii) Draw the structure of ethane showing all bonds between carbon and hydrogen atoms
 - (iii) Write a balanced chemical equation using formula to show ethane burning completely in oxygen to make carbon dioxide and water.
- (viii) At GCSE you met reversible reaction (Le Chatelier's Principle) these questions ask you about this reversible reaction in which the alcohol ethanol (CH₃CH₂OH(g)) is a product
 $CH_2=CH_2(g) + H_2O(g) \rightleftharpoons CH_3CH_2OH(g)$
 - (i) If the forward reaction gives out heat (exothermic) what will happen to the yield of ethanol if the temperature is increased.
 - (ii) what will happen to the yield of ethanol if the pressure is increased?

Make sure that you have done as much research as possible to help you to answer these questions. This is called INDEPENDENT LEARNING. At A level be prepared to do a lot more independent learning. You will be tested on your understanding of the material covered on this homework. Below are 5 top tips for revising for a test

5 Top Tips

1. Keep all of your notes dated and in a file
2. Review all notes at the end of every day
3. Make flashcards whenever you are asked to memorise information for mastery tests
4. Summarise a topic onto one sheet of A4 paper e.g. using a mindmap.
5. To prepare for any test get a friend to test you on your flashcards.