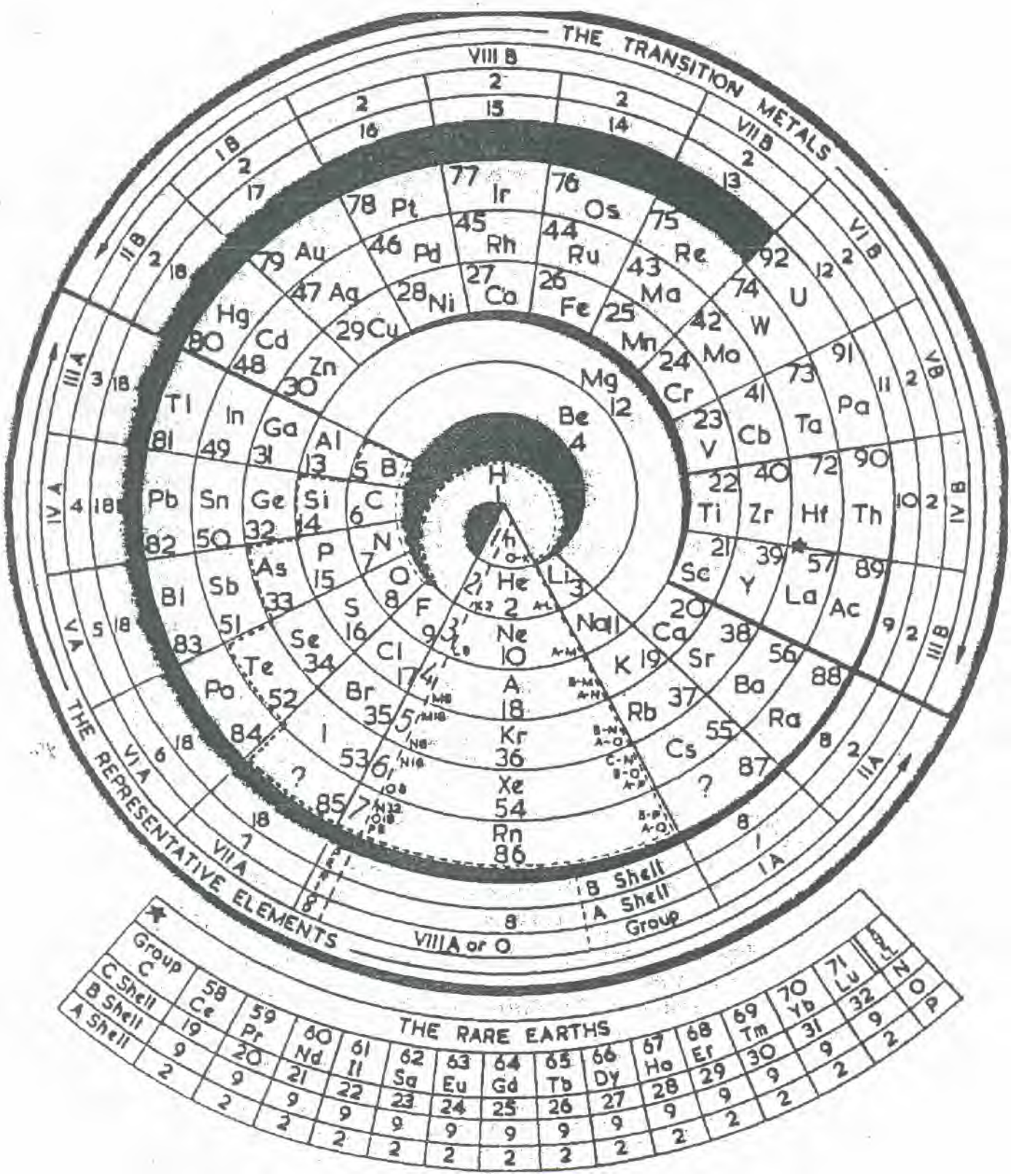
Varndean College Chemistry Department



Chemistry "A flying start"

The following pages give you a brief look at some of the work you will be covering in chemistry.

Getting and staying organised

The key to level 3 success is good organisation; keeping your notes in good order and keeping track of progress through the course is essential.

You should record homework details and the hand-in date in your college planner. Bring it to all lessons as the Chemistry Department frequently runs extra-curricular activities and this will enable you to record and remember the dates.

Get yourself a large folder (just for Chemistry) with a set of dividers and file your notes at the end of each short section. You will also need to get a smaller folder for transporting notes to and from college, and for keeping your current notes in.

Bring paper, a pencil, calculator and pens to every lesson.

You will buy a textbook which supports your Level 3 Chemistry course.

Preparation and reading ahead

You should do regular background reading — expect to spend a weekly session of around an hour doing Chemistry reading of some sort. **Reading ahead from your textbook is the best preparation for coming to a lesson;** setting aside a regular period for Chemistry reading is a good habit to develop and will stand you in good stead at revision time. There is a reading list on the chemistry intranet.

Homework

You will be set homework each week, generally written homework, but tutors do set a variety of tasks so be prepared to undertake a research activity, a computer quiz, work to be done in pairs etc. You may also be set some specific reading from your textbook/CD, or from a book/journal/CD in the LRC.

Chemistry Online

You can access the Chemistry intranet from college and from home if you are connected to the web. There are sections for AS, A2 and IB Chemists and a general section relevant to all.

All the vital information about your course is there i.e. specifications, coursework requirements, numerous activities and help sheets, copies of homework and feedback on homework. You should become familiar with it as soon as possible and it will become a valuable resource and support to your work throughout your time with the Chemistry Department.

The following pages should refresh your general chemistry skills and set you off on the right track.

Have a go. You may well find some of it difficult but persevere or see if you can work with someone.

A measurement can only be as accurate and precise as the instrument that produced it. A scientist must be able to express the accuracy of a number, not just its numerical value. We can determine the accuracy of a number by the number of significant figures it contains.

1) All digits 1-9 inclusive are significant.
   Example: 129 has 3 significant figures.
2) Zeros between significant digits are always significant.
   Example: 5,007 has 4 significant figures.
3) Trailing zeros in a number are significant only if the number contains a decimal point.
   Example: 100.0 has 4 significant figures.
   100 has 1 significant figure.
4) Zeros in the beginning of a number whose only function is to place the decimal point are not significant.
   Example: 0.0025 has 2 significant figures.
5) Zeros following a decimal significant figure are significant.
   Example: 0.000470 has 3 significant figures.
   0.47000 has 5 significant figures.

Determine the number of significant figures in the following numbers.

1. 0.02 _____
2. 0.020 _____
3. 501 _____
4. 501.0 _____
5. 5,000 _____
6. 5,000. _____
7. 6,051.00 _____
8. 0.0005 _____
9. 0.1020 _____
10. 10,001 _____

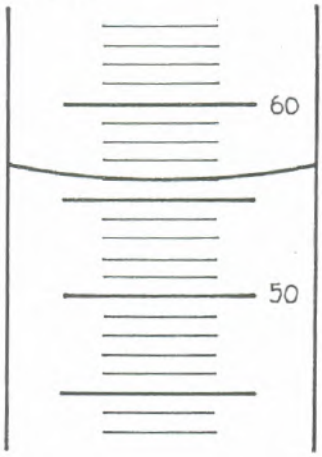
Determine the location of the last significant place value by placing a bar over the digit. (Example: $1.70\bar{0}$)

1. 8040 _____
2. 0.0300 _____
3. 699.5 _____
4. 2.000×10^2 _____
5. 0.90100 _____
6. 90,100 _____
7. 4.7×10^{-8} _____
8. 10,800,000. _____
9. 3.01×10^{21} _____
10. 0.000410 _____

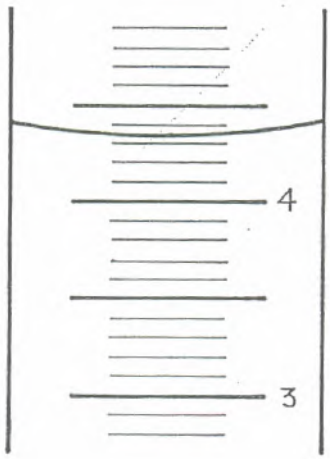
MEASURING LIQUID VOLUME

Name _____

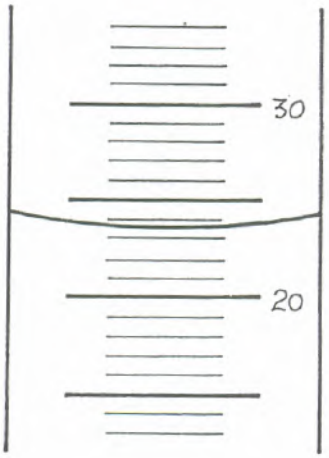
What volume is indicated on each of the graduated cylinders below? The unit of volume is in cm^3



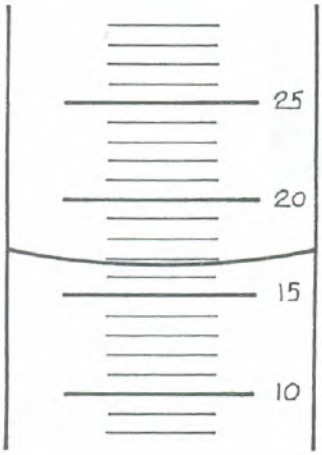
a) _____



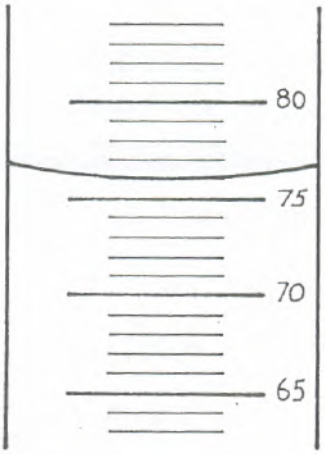
b) _____



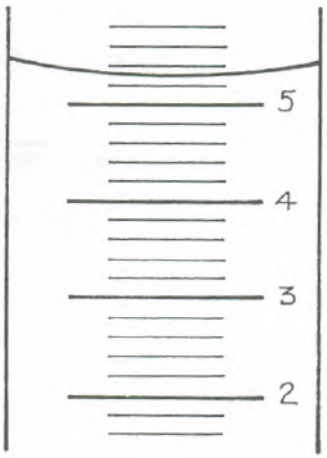
c) _____



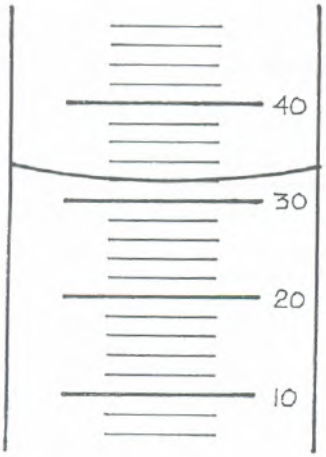
d) _____



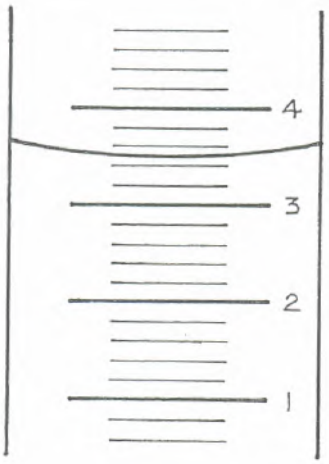
e) _____



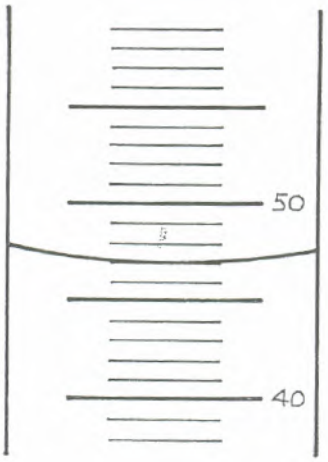
f) _____



g) _____



h) _____



i) _____

Chemical Formulae (see below for examples on how to assign formulae)

Here are a few examples:

- Sodium Sulphate

- Calcium hydrogen carbonate

Note: A bracket *must* be placed around the radical if it is multiplied by 2 or more *and* composed of more than one element.

Eg $MgBr_2$ no bracket required
$Ca(OH)_2$ bracket *essential* as $CaOH_2$ is incorrect.

- Often you can cancel the numbers on the two formulae:

  $Ca_2(CO_3)_2 = CaCO_3$

  However, you should **not** do this for organic compounds: C_2H_4 has two atoms of carbon and four of hydrogen so it cannot be cancelled down to CH_2.

- Copper(I) oxide means use copper valency 1, ie Cu_2O: lead(II) nitrate means use lead valency 2, ie $Pb(NO_3)_2$

The periodic table can help you to find the valency of an element and hence the formula of its compounds.

Although you can use the table above to work out the formulae of many compounds it is important to realise that all formulae were originally found by experiment.

On page 11 you will find a table of the more common elements and groups that you may have met at GCSE. Also included are a few that you will meet in the first few weeks of your Advanced course or are mentioned in some of the calculations in this booklet. These are in italics.

⇒ The following page gives the information needed to complete the formulae task.

Symbols and Valences of Common Elements and Radicals

ELEMENTS			RADICALS		
	Symbol	**Valency**		**Symbol**	**Valency**
Aluminium	Al	3	Ammonium	NH_4	1
Barium	Ba	2	Carbonate	CO_3	2
Bromine	Br	1	Chloride	Cl	1
Calcium	Ca	2	Hydrogen-carbonate	HCO_3	1
Carbon	C	4	Hydrogen-sulphate	HSO_3	1
Chlorine	Cl	1	Hydroxide	OH	1
Cobalt	Co	2	Nitrate	NO_3	1
Copper	Cu	1&2	Nitrite	NO_2	1
Hydrogen	H	1	Sulphate	SO_4	2
Iodine	I	1	Sulphite	SO_3	2
Iron	Fe	2&3			
Lead	Pb	2&4	*Chlorate(I)*	*ClO*	*1*
Magnesium	Mg	2	*Chlorate(V)*	ClO_3	*1*
Manganese	Mn	2&4	*Vanadate(V)*	VO_3	*1*
Mercury	Hg	1&2	*Manganate(VII)*	MnO_4	*1*
Nitrogen	N	3&5	*Chromate(VI)*	CrO_4	*2*
Oxygen	O	2	*Dichromate(VI)*	Cr_2O_7	*2*
Phosphorus	P	3&5			
Potassium	K	1			
Silicon	Si	4			
Silver	Ag	1			
Sodium	Na	1			
Sulphur	S	2,4,6			

Exercise 2

Writing formulae from names

Use the data in the table on page 11 to write the formulae of the following. Before you start this exercise, make sure you have read *Section 3* (*Naming of compounds* on page 19) of this booklet.

1	Sodium Chloride
2	Sodium Hydroxide
3	Sodium Carbonate
4	Sodium Sulphate
5	Sodium Phosphate
6	Potassium Chloride
7	Potassium Bromide
8	Potassium Iodide
9	Potassium Hydrogen Carbonate
10	Potassium Nitrite
11	Magnesium Chloride
12	Magnesium Nitrate
13	Magnesium Hydroxide
14	Magnesium Oxide
15	Magnesium Carbonate

BALANCING CHEMICAL EQUATIONS

Name _____

Rewrite and balance the equations below.

1. $N_2 + H_2 \rightarrow NH_3$ _____
2. $KClO_3 \rightarrow KCl + O_2$ _____
3. $NaCl + F_2 \rightarrow NaF + Cl_2$ _____
4. $H_2 + O_2 \rightarrow H_2O$ _____
5. $AgNO_3 + MgCl_2 \rightarrow AgCl + Mg(NO_3)_2$ _____
6. $AlBr_3 + K_2SO_4 \rightarrow KBr + Al_2(SO_4)_3$ _____
7. $CH_4 + O_2 \rightarrow CO_2 + H_2O$ _____
8. $C_3H_8 + O_2 \rightarrow CO_2 + H_2O$ _____
9. $C_8H_{18} + O_2 \rightarrow CO_2 + H_2O$ _____
10. $FeCl_3 + NaOH \rightarrow Fe(OH)_3 + NaCl$ _____
11. $P + O_2 \rightarrow P_2O_5$ _____
12. $Na + H_2O \rightarrow NaOH + H_2$ _____
13. $Ag_2O \rightarrow Ag + O_2$ _____
14. $S_8 + O_2 \rightarrow SO_3$ _____
15. $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$ _____
16. $K + MgBr_2 \rightarrow KBr + Mg$ _____
17. $HCl + CaCO_3 \rightarrow CaCl_2 + H_2O + CO_2$ _____