N5 Chemistry
Unit 2: Nature's Chemistry
Homework 2.5

1. Which line in the table correctly shows how the concentration of a solution changes by adding more solute or by adding more solvent?

	Adding solute	Adding solvent
A	concentration falls	concentration rises
B	concentration falls	concentration falls
C	concentration rises	concentration falls
D	concentration rises	concentration rises

Answer _____

2. The table shows the numbers of protons, electrons and neutrons in four particles, **W**, **X, Y** and **Z**.

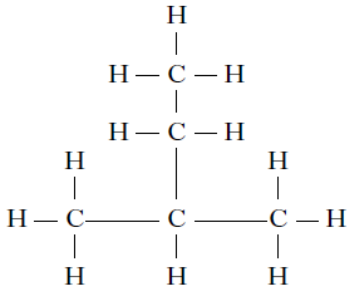
Particle	Protons	Electrons	Neutrons
W	17	17	18
X	11	11	12
Y	17	17	20
Z	18	18	18

Which pair of particles are isotopes?

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

Answer _____

3.



The name of the above molecule is

A 1, 1-dimethylpropane
B 2-ethylpropane
C 2-methylbutane
D 3-methylbutane.

Answer _____

4. $2K^+(aq) + 2I^-(aq) + Pb^{2+}(aq) + 2NO_3^-(aq)$

$\downarrow$

$Pb^{2+}(I^-)_2(s) + 2K^+(aq) + 2NO_3^-(aq)$

The type of reaction represented by the equation above is

A addition
B neutralisation
C precipitation
D combustion.

Answer _____

5. In which of the following reactions is oxygen used up?

A Combustion
B Neutralisation
C Addition
D Fermentation

Answer _____ 5

6. a) The table gives information about some members of the alkane family.

Name	Molecular formula	Boiling point/°C
nonane	C_9H_{20}	151
decane	$C_{10}H_{22}$	174
undecane	$C_{11}H_{24}$	196
dodecane	$C_{12}H_{26}$	

Predict the boiling point of dodecane. _____ °C 1

b) What term is used to describe any family of compounds, like the alkanes, which have the same general formula and similar chemical properties?

_____ 1

c) The equation for the burning of nonane is:

$$C_9H_{20} + 14O_2 \longrightarrow 9CO_2 + 10H_2O$$

Calculate the mass of water produced when 6·4 g of nonane is burned.

Show your working clearly.

_____ g 3

d) A pupil designed an experiment to measure the quantity of heat produced when a known mass of nonane was burned. Draw a **labelled** diagram of the apparatus which could be used to measure the quantity of heat produced by burning nonane.

2

7. Molten iron is used to join steel railway lines together. Molten iron is produced when aluminium reacts with iron oxide. The equation for the reaction is:

$$2Al + Fe_2O_3 \longrightarrow 2Fe + Al_2O_3$$

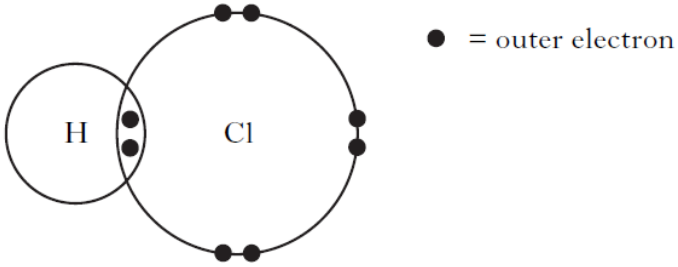
a) Calculate the mass of iron produced from 40 g of iron oxide.

_____ g 3

b) The formula for iron oxide is Fe_2O_3.
What is the charge on this iron ion?

_____ 1

8. Hydrogen can form bonds with other elements. The diagram shows the arrangement of outer electrons in a molecule of hydrogen chloride.



a) What type of bonding is present in a hydrogen chloride molecule?

_____ 1

b) Draw a similar diagram, showing **all** outer electrons, to represent a molecule of phosphine, PH_3.

1

c) Draw a diagram to show the **shape** of a phosphine molecule.

1

9. The octane number of petrol is a measure of how efficiently it burns as a fuel. The higher the octane number, the more efficient the fuel.

a) What is a fuel?

_____ 1

b) The octane numbers for some hydrocarbons are shown.

Hydrocarbon	Number of carbon atoms	Octane number
hexane	6	
heptane	7	0
octane	8	–19
2-methylpentane	6	71
2-methylhexane	7	44
2-methylheptane	8	23

i) What is meant by the term hydrocarbon?

_____ 1

ii) If a hydrocarbon fuel burns in a plentiful supply of oxygen what **two** products are formed?

_____ 1

iii) Predict the octane number for hexane using the information in the table.

_____ 1

iv) State the relationship between the structure of the hydrocarbon and their efficiency as fuels.

_____

_____

_____ 1

v) Draw the **full structural** formula for 2-methylheptane.

1

Total Marks 25