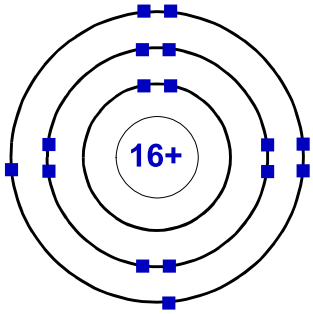
Name:_____

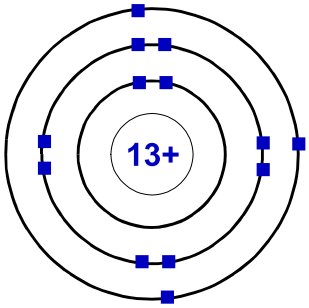
Chemistry Unit Test – SNC 2D

1. Complete each Bohr diagram. Include all details:

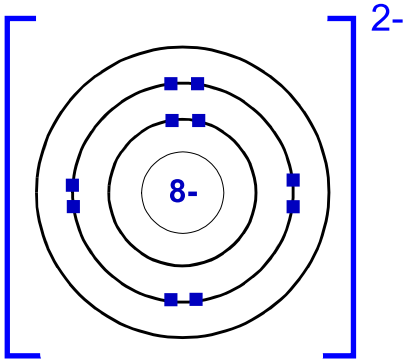
S



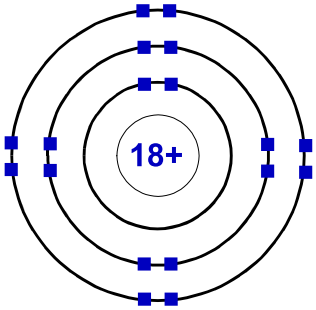
Al



O^{2-}



Ar



2. Give a definition for the octet rule:

When elements react to form compounds, each element will either lose or gain electrons to become like the nearest noble gas. When this happens, the element will have the same electron arrangement as the noble gas.

3. Write the ion that forms as a result of the octet rule for each of the following atoms (first one is done for you):

$_{11}Na$	Na^{1+}
$_{33}As$	As^{3-}
$_{20}Ca$	Ca^{2+}
$_{19}K$	K^{1+}
$_{17}Cl$	Cl^{1-}

$_{16}S$	S^{2-}
$_{13}Al$	Al^{3+}
$_{53}I$	I^{1-}
$_{1}H$	H^{1+}
$_{15}P$	P^{3-}

$_{6}C$	C^{4+}/C^{4-}
$_{49}In$	In^{3+}
$_{10}Ne$	Ne
$_{14}Si$	Si^{4+}/Si^{4-}
$_{8}O$	O^{2-}

4. Provide either names or formula for each of the following:

calcium chloride	$CaCl_2$	KCl	potassium chloride
calcium chlorate	$Ca(ClO_3)_2$	K_2SO_4	potassium sulphate
sodium sulphide	Na_2S	Au_2SO_4	gold(I) sulphate
sodium sulphate	Na_2SO_4	AgCl	silver chloride
nickel(II) nitride	Ni_3N_2	HgCl	mercury(I) chloride
iron(III) carbonate	$Fe_2(CO_3)_3$	$ZnCl_2$	zinc chloride
manganese(VII) iodide	MnI_7	$Sr(NO_3)_2$	strontium nitrate
lead(II) nitrate	$Pb(NO_3)_2$	V_2O_5	vanadium(V) oxide

5. For each of the following descriptions, provide the evidence of a chemical change:

a) two solutions are mixed together, there is the formation of a bright red compound that makes the mixed solution cloudy and no longer see through

change of colour

formation of a precipitate

b) a spark is provided to ignite the gas of a Bunsen burner to produce a flame

production of heat or light

c) after shaking a can of pop, opening the can results in an abrupt overflow of fizz

evolution of a gas

d) when the indicator bromothymol blue is place in acid, it turns from blue to yellow, slowly adding base will turn the colour back to blue (will pass through a green phase on the way to blue)

change of colour

6. What type of change is the melting an ice cube to form water? Explain the reason for your choice.

physical change – no new substance is formed, change of state

7. What type of change is creating carbon dioxide and water from the combustion of methane. Explain the reason for your choice.

chemical change – new substance is formed

8. For each of the following reactions, provide chemical coefficients to balance each equation and state the type of equation:

synthesis:	$A + B \rightarrow AB$
decomposition:	$AB \rightarrow A + B$
single replacement: (hint – find elements)	$A + BC \rightarrow AC + B$ $D + BC \rightarrow BD + C$
double replacement:	$AB + CD \rightarrow AD + CB$
combustion of a hydrocarbon:	$C_xH_y + O_2 \rightarrow CO_2 + H_2O$

BALANCE!!!	REACTION TYPE
$2KClO_3 \rightarrow 2KCl + 3O_2$	***decomposition***
$P_4O_{10} + 6H_2O \rightarrow 4H_3PO_4$	***synthesis***
$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$	***combustion of a hydrocarbon***
$Fe_2(SO_4)_3 + 6KOH \rightarrow 3K_2SO_4 + 2Fe(OH)_3$	***double replacement***
$2Al + 3FeO \rightarrow Al_2O_3 + 3Fe$	***single replacement***
$4Al + 3O_2 \rightarrow 2Al_2O_3$	***synthesis***
$Al_2(SO_4)_3 + 3Ca(OH)_2 \rightarrow 2Al(OH)_3 + 3CaSO_4$	***double replacement***
$2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2$	***single replacement***

9. Fill out this table to give a comparison between the properties of an acid and a base:

ACIDS	BASES
sour	***bitter***
feels clean	***feels slippery***
litmus turns red	***litmus turns blue***
reacts with metals	***does not react with metals***
H^{1+} (hydrogen ion)	***OH^{1-} (hydroxide ion)***

10. What are the common products of a neutralization reaction? Give an example using both a word equation and a chemical equation for hydrochloric acid (HCl) and sodium chloride (NaOH)

a salt plus water
word equation: ***hydrochloric acid + sodium hydroxide ➜ sodium chloride + water***
chemical equation: ***HCl + NaOH ➜ NaCl + H_2O***

11. Please look at the following information regarding pH indicators:

INDICATOR NAME	pH COLOUR RANGE													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
methyl orange	red				orange									
litmus	pink						blue							
bromothymol blue	yellow						blue							
phenolphthalein	clear							pink						
alizarin yellow	yellow								pink					

Come up with a pH range for each substance based on the following information:

a) vinegar – turn litmus to pink
– methyl orange to red

1 to 4

b) washing soda – turns litmus to blue
– alizarin yellow to pink

8 to 14

c) baking soda – turns bromothymol to blue
– phenolphthalein to clear

7 to 8.5

d) calcium hydroxide – turns phenolphthalein to pink
– alizarin yellow to yellow

8.5 to 10

12. Draw a pH scale from 1 to 14. Label the portion that is acidic, basic and neutral. On this scale place the following items
    a) sulphuric acid (a very strong acid used in batteries)
    b) sodium hydroxide (lye, a very strong base used to make soap pioneer days)
    c) baking soda
    d) lemon juice
    e) good face soap

    You may wish to draw your scale vertically.

Please look this up on page 230 of your text, or follow the links I have added to the website.

13. For each of the following gases, indicate if the gas is combustible, supports combustion or extinguishes combustions. Also indicate how you could test this gas with either a glowing splint or a flaming splint. One example is done for you:

GAS	COMBUSTION PROPERTIES	SPLINT TEST
Xenon (Xe)	extinguishes combustion	flaming splint goes out
Hydrogen (H_2)	***combustible***	***flaming splint causes popping sound***
Oxygen (O_2)	***supports combustion***	***glowing splint bursts into flame***
Carbon Dioxide (CO_2)	***extinguishes combustion***	***flaming splint goes out***
Acetylene (C_2H_2)	***combustible***	***flaming splint causes popping sound***