



STEPPING STONE
SCHOOL (HIGH)

CLASS :IX

Subject:Chemistry

Date:19/05/2020

Topic:Action of heat on given(unknown)substances Time Limit:40 min.

Worksheet No.:6

EXPLANATION

II. ACTION OF HEAT ON THE GIVEN (UNKNOWN) SUBSTANCE

Some substances give off water of crystallization, while some decompose to give off some gas/vapour. Some salts change their colour on heating while some others sublime. Careful observation of the changes and recognition of the gases evolved give useful information about the identification of the salt.

Observation	Identification of substance
A1. i) The orange red amorphous powder changes to deep red and on further heating appears almost black in colour. ii) It gives a colourless and odourless gas which rekindles a glowing wooden splinter. iii) A silvery mirror is formed near the mouth of the test tube.	Substance is Mercury (II) oxide. $2\text{HgO} \rightarrow 2\text{Hg} + \text{O}_2$ Silver mirror Gas evolved is oxygen.
2. i) The red/orange amorphous powder changes to a reddish brown colour, on strong heating. ii) It gives off a colourless and odourless gas, which rekindles a glowing wooden splint. iii) The residue on cooling changes to a yellow colour. It partly fuses in glass and stains the test tube yellow.	Substance is red lead . The residue is lead oxide. $2\text{Pb}_3\text{O}_4 \rightarrow 6\text{PbO} + \text{O}_2$ (Tri-lead (Yellow) tetraoxide) Gas evolved is oxygen.
3. i) The chocolate brown amorphous powder, changes to reddish brown colour on strong heating. ii) It gives off a colourless and odourless gas, which rekindles a glowing wooden splint. iii) The residue on cooling changes to a yellow colour. It partly fuses in glass and stains the test tube yellow.	Substance is lead (IV) oxide . The residue is lead oxide . $2\text{PbO}_2 \rightarrow 2\text{PbO} + \text{O}_2$ (Yellow) Gas evolved is oxygen.
B1. i) The light green amorphous powder, changes to black colour on strong heating. ii) It gives off a colourless and odourless gas, which extinguishes burning wooden splinter. iii) The gas turns lime water milky.	Substance is copper (II) carbonate The residue is copper oxide . $\text{CuCO}_3 \rightarrow \text{CuO} + \text{CO}_2$ (Black) Gas evolved is carbon dioxide .
2. i) The light amorphous solid which is white in colour, on strong heating, changes to pale yellow colour. ii) It gives off a colourless and odourless gas, which turns lime water milky. iii) The residue on cooling changes to a white colour.	Substance is zinc carbonate . The residue is zinc oxide . $\text{ZnCO}_3 \rightarrow \text{ZnO} + \text{CO}_2$ Gas evolved is carbon dioxide .
1. i) The white crystalline solid, on strong heating, swells and then melts, giving steamy vapours. ii) The steamy vapours condense on the cooler parts of the test tube to form tiny droplets of a colourless liquid. iii) The colourless liquid when added to white anhydrous copper sulphate turns it blue in colour. iv) The colourless liquid turns blue coloured cobalt chloride paper pink. v) On cooling, a white amorphous residue is left.	Substance is washing soda crystals . The residue is sodium carbonate . $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O} \rightarrow \text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O}$ (steam) Gas evolved is water vapour .
1. i) The blue crystalline solid on heating crumbles to form white amorphous powder. ii) It gives off steamy vapours, which on condensing on the cooler parts of the test tube forms a colourless liquid (Water). iii) The liquid turns blue coloured cobalt chloride paper pink. iv) On strong heating, black solid is formed and gases are evolved. v) The evolved gas turns moist blue litmus red and changes orange colour of acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution green.	Substance is blue vitriol . The residue is Copper sulphate . $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \rightarrow \text{CuSO}_4 + 5\text{H}_2\text{O}$ Gas evolved is water vapour . Residue is black copper oxide $2\text{CuSO}_4 \rightarrow 2\text{CuO} + 2\text{SO}_2 + \text{O}_2$ Gas evolved is sulphur dioxide and oxygen.

<p>D1. i) White crystalline deliquescent solid. ii) On strong heating, it melts to form a white sticky mass which gives off <i>steam vapours</i>. iii) On heating more strongly, the white residue gives off <i>reddish brown fumes</i> which turn moist blue litmus paper red. iv) A glowing wooden splint held in the <i>reddish brown</i> gas (NO_2) bursts into flame. This reddish brown gas is mixed with oxygen. v) The residue is pale yellow, when hot, and on cooling, it changes to a white colour.</p>	<p>Substance is zinc nitrate hexahydrate. The residue is zinc oxide. $\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O} \rightarrow \text{Zn}(\text{NO}_3)_2 + 6\text{H}_2\text{O}$ $2\text{Zn}(\text{NO}_3)_2 \rightarrow 2\text{ZnO} + 4\text{NO}_2\uparrow + \text{O}_2\uparrow$ Gases evolved are water vapour, nitrogen dioxide and oxygen.</p>
<p>2. i) The <i>bluish green crystalline</i> solid, on strong heating, melts to form a bluish green mass and gives off <i>steam vapours</i> which condense on the cooler parts of the test tube to form droplets of water. ii) On further heating, the <i>bluish green</i> mass changes to a black residue. It is copper (II) oxide. iii) It gives off a <i>reddish brown</i> gas. iv) It also gives a gas which rekindles a glowing splinter <i>i.e.</i> oxygen.</p>	<p>Substance is copper (II) nitrate hexahydrate. $\text{Cu}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O} \rightarrow \text{Cu}(\text{NO}_3)_2 + 6\text{H}_2\text{O}$ $2\text{Cu}(\text{NO}_3)_2 \rightarrow 2\text{CuO} + 4\text{NO}_2\uparrow + \text{O}_2\uparrow$ The residue is copper oxide. The gases evolved are water vapour, nitrogen dioxide and oxygen.</p>
<p>3. i) The heavy, white crystalline solid, on strong heating, <i>crumbles</i> with a crackling noise. ii) It gives off a reddish brown gas, which turns moist blue litmus paper red. iii) When a glowing wooden splint is held in the reddish brown gas, it relights. iv) The residue is <i>reddish brown when hot</i>. On cooling, it changes to yellow and partly fuses in glass and stains it yellow.</p>	<p>Substance is Lead (II) nitrate. The residue is lead (II) oxide. $2\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$ The gases evolved are nitrogen dioxide and oxygen.</p>
<p>4. i) The <i>white crystalline solid</i> on strong heating sublimes to form dense white fumes. ii) The dense white fumes form a white <i>powdery mass</i> on the cooler parts of the test tube. iii) No residue is left behind</p>	<p>Substance is Ammonium chloride. $\text{NH}_4\text{Cl} \rightarrow \text{NH}_3\uparrow + \text{HCl}\uparrow$</p>
<p>5. i) The <i>greyish brown crystalline solid</i> on strong heating sublimes to form violet vapours, which form greyish brown crystals on the cooler parts of the test tube. ii) No residue is left at the bottom of the test tube. iii) A filter paper dipped in starch solution turns blue when brought in contact with the vapour.</p>	<p>Substance is Iodine. $\text{I}_2 \rightarrow 2\text{I}\uparrow$ (violet vapour)</p>
<p>6. i) The <i>orange red crystalline solid</i> on strong heating swells up and gives off <i>steam fumes</i>, which condense on the cooler parts of the test tube to form tiny droplets of water. ii) The colourless liquid turns cobalt chloride paper pink. iii) Greenish grey mass of chromium oxide is left behind. iv) A colourless odourless gas is given out which is neither combustible nor does it supports combustion. It does not turn lime water milky. The gas is nitrogen.</p>	<p>Substance is Ammonium dichromate. $(\text{NH}_4)_2\text{Cr}_2\text{O}_7 \rightarrow \text{Cr}_2\text{O}_3 + \text{N}_2\uparrow + 4\text{H}_2\text{O}$ Orange red (greenish-grey) Gases evolved are water vapour and nitrogen.</p>

WORK TO DO

Learn the observations and identification of the substance to answer the questions that come up in the worksheet below

TEST YOURSELF

(A comprehensive worksheet based on identification of gases , cations action of the heat on given salts and action of sulphuric acid on given substance)

TIME : 40 Min.

- 1) Name the gas that:-
 - a) relights a glowing splinter and is neutral to litmus
 - b) turns lime water milky but has no effect on acidified potassium dichromate solution.
 - c) changes lead acetate solution black.
 - d) is reddish brown in colour.
- 2) Name the residue left behind when Zinc Nitrate is heated.
- 3) Name the green coloured salt which on heating becomes black.
- 4) On heating Zinc Oxide, it undergoes physical or chemical change.
- 5) Name the gas produced when lead nitrate is heated.
- 6) Name the liquid formed when hydrated Copper Sulphate is heated. Give me the identification test of the liquid.
- 7) What is the colour of hot and cold Lead Oxide.

- 8) Name the gases produced when ammonium dichromate is heated.
- 9) What is the colour of iodine a) vapour b) crystals.
- 10) State the colour of Chromium Oxide.
- 11) Name the salt that can be used to show volcanic eruption in science exhibition.
- 12) The acid radicals detected by dilute sulphuric acid is listed below. Complete the chart.

<u>ACID RADICALS</u>	<u>FORMULA</u>	<u>GAS EVOLVED</u>
Carbonate		
Sulphite		
Sulphide		

- 13) Match the following:

<u>COLUMN 1</u>	<u>COLUMN 2</u>
a)Smell the burning sulphur	Hydrogen Sulphide
b)Burns with 'pop' sound	b)Sulphur Dioxide
c)Smell of rotten eggs	c)Hydrogen
d)Turns lime water milky	d)Oxygen
e)Decrepitates	e)Nitrogen Dioxide
f)Furans of Volcano	f)Hydrogen Chloride acid gas
g)Sublimes	g)Ammonium Dichromate
h)Fumes in air	h)Iodine
i)Reddish brown	i) Lead Nitrate
j)Helps to burn	

