



# Clemas Study Centre

31<sup>A</sup> Cemetery Rd Sapele

## CHEMISTRY

TOPIC: OXIDES OF NITROGEN-PART 2

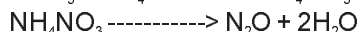
By Kingsley Idiagbor, B.Sc. (Hons), PGDCs, mnsm

### Dinitrogen (I) Oxide, N<sub>2</sub>O

This gas is commonly called *laughing gas* because it causes hysteria or uncontrollable fits of laughter when inhaled.

#### Laboratory Preparation

N<sub>2</sub>O is prepared by the thermal decomposition of ammonium trioxonitrate (V). The NH<sub>4</sub>NO<sub>3</sub> itself is first obtained by heating a mixture of KNO<sub>3</sub> and NH<sub>4</sub>Cl. This is because heating the NH<sub>4</sub>NO<sub>3</sub> directly is ill-advised because it is exothermic and may lead to explosion.



#### Test

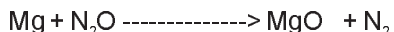
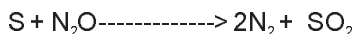
When a glowing taper is introduced into the unknown gas, it is rekindled. The distinguishing features between the gas and oxygen which also shares this property may be found in the table below.

#### Physical properties

- The gas is colourless with sickly smell and pleasant taste.
- It is fairly soluble in water
- It is one and one-half times denser than air.
- It is neutral to litmus paper.

#### Chemical properties

- Action of heat: N<sub>2</sub>O does not burn in air. Like oxygen, it rekindles glowing taper. It also supports combustion of burning substance and decomposes to yield Nitrogen gas.



- Reduction by hot metals: Nitrogen (II) oxide reacts with heated metals which reduces it to N<sub>2</sub>. Thus:

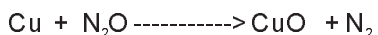


Table: Distinguishing features between Dinitrogen (I) oxide and oxygen

	Dinitrogen (I) oxide	Oxygen
(i)	has sickly and pleasant smell	odourless
(ii)	no reaction with Nitrogen(II)oxide	reacts with Nitrogen (II) oxide to give reddish-brown fumes of NO <sub>2</sub>
(iii)	oxidizes heated copper and leaves residual gas, N <sub>2</sub>	oxidizes heated copper and leaves no residual gas
(iv)	fairly soluble in water	slightly soluble in water.

#### QUESTIONS

- How is dinitrogen (I) oxide distinguished from oxygen that also supports combustion?
- With the aid of diagram and equation, show how dinitrogen (I) oxide may be prepared in the lab.
- Give three chemical properties of dinitrogen (I) oxide.

#### END OF PAPER