UGANDA CERTIFICATE OF EDUCATION

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PROPOSED SCORING SCHEME

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SECTION: *A*

item	RESPONSE	SCORE
1.a	**Atomic bomb/nuclear bomb**, operates by **nuclear fission**	02
1.b	The energy released during the process of nuclear fission, through splitting of a heavy nucleus when it is bombarded by a fast-moving neutron to form a smaller nucleus. $^{235}_{92}U + {}^{1}_{0}U \longrightarrow {}^{92}_{36}Kr + {}^{141}_{56}Ba + 3\ {}^{1}_{0}n$ + energy Heats water to produce steam at high pressure, which drives turbines that produces electricity in a nuclear reactor.	02
1.c	Side effects: • Radiations emitted result to DNA mutation resulting to hereditary defects and diseases. • Radiations emitted cause burns on the skin, damage of the liver and reduced fertility. Mitigations: • Proper dispose of radio active wastes e.g. in bankers or burried underground. • Wearing of personal protective equipment's e.g. cloths made from lead for people working in radio active areas.	03
item 2. a	Calcium oxide is an ionic compound, because it's formed through transfer of two electrons from calcium atom to two oxygen atoms	03

2.a	Carbon dioxide gas is a covalent compound, because it's formed through sharing of outer most electrons between carbon atom and oxygen atom.	
2.b	• Carbon dioxide gas does not support burning/combustion. • Carbon dioxide gas is slightly soluble in water forming a weak acid, carbonic acid. • Carbon dioxide does not conduct electricity. • Carbon dioxide exists has a molecule. *Uses of Carbon dioxide gas include:* • used in fire extinguishers to put out fire because it does not support burning. • Used in the manufacture of fizzy drinks to improve on the taste and to preserve them. • Carbon dioxide is used in refrigeration in form of dry ice thus used to deep freeze food.	03
2.c	Molar mass of $CaCO_3$ = 1(40) +1(12) +3(16) =100g 1 mole of calcium carbonate decomposes to produce 1mole of carbon dioxide gas. 100g of $CaCO_3$ produces 1(22.4) dm^{-3} of CO_2 gas at *s.t.p* 25g of $CaCO_3$ will produce $(\frac{25 \times 22.4}{100})$ dm^{-3} CO_2 gas at *s.t.p* = 5.6 dm^{-3} CO_2 gas at *s.t.p* **Or** 100g of $CaCO_3$ contains 1 mole 25g of $CaCO_3$ will contain $(\frac{25 \times 1}{100})$ moles = 0.25 moles 1 mole of $CaCO_3$ occupies 1(22.4) dm^{-3} of CO_2 gas at *s.t.p* 0.25 moles $CaCO_3$ will occupy $(\frac{0.25 \times 22.4}{1})$ dm^{-3} of CO_2 gas = 5.6 dm^{-3} CO_2 gas at *s.t. p*	03

2.d	*Impacts of carbon dioxide gas:* • Accumulation of carbon dioxide in the atmosphere results to increased green house effect thus global warming and famine. • Accumulation of carbon dioxide in the atmosphere results to production of acidic rains that deplete buildings and also lower the pH of both water bodies and soil. ***Mitigations:*** • Carry out afforestation since trees reduce on the greenhouse effect through photosynthesis. *Impacts of calcium oxide:* • Improper disposal of calcium oxide result to water pollution thus harming the aquatic life. • Over use of calcium oxide results to increased soil alkalinity thus reducing nutrient availability. ***Mitigations:*** • Limited use of calcium oxide during agriculture.	02

Note:

The process of production is composed of the following:

- All the necessary raw materials. **Rm**
- Vessel. **V**
- Chemical process. **Cp**
- Physical process. **Pp**
- Conversion to the desired product. **Cd**
- Purification. **Pr**

Basis of assessment.	**Item 3 *Response***
Process of production Score 03 V Pr Ch Cp Pp Cd	*<u>Extraction of copper from copper pyrites involves the following major stages:</u>* **a) Concentration of the ore:** • The ore is crushed and ground to fine powder, mixed with oil and water in a concentration tank to remove impurities. • Compressed air is blown through the mixture in the tank a process known as **froth flotation,** to agitate the mixture. • Oil coated particles of the ore float on top of the tank and are skimmed off and dried. **b) Reduction or roasting of the ore:** • Copper pyrites are roasted in a furnace to form copper(I) suphide, iron(II) oxide and Sulphur dioxide gas. Equation……. • Silicon dioxide is added to the reside in the furnace. Where it reacts with iron(II) oxide to form iron(II) silicate, slag leaving behind the copper(I) sulphide. Equation……. • Slag floats on top of the mixture and it is skimmed off. The copper(I) sulphide is heated strongly in a furnace with **limited supply** of oxygen to form *impure copper* and sulphur dioxide gas Equation …….. **c) Refining:** • The impure copper is purified by electrolysis using impure copper as anode and pure copper as cathode in an electrolyte cell containing acidified copper(II) sulphate solution as electrolyte.

	• Impure copper dissolves to form copper(II) ions and pure copper is deposited at the cathode. Equations……
Side effects of the production plant on environment, how it occurs and its mitigation Score 03	Air pollution by waste gases, sulphur dioxide and sulphur trioxide which are acidic gases thus lead to acidic rains which deplete buildings, low the pH of water and soil thus low crop yields and soil productivity. **Mitigated** by fitting filters or scrubbers in chimneys to remove sulphur dioxide. *Effect + how it occurs + mitigation*
Social benefits of the production plant *Score 03*	Source of employment opportunity to the locals, improved income therefore improved or better standards of living. *Social benefit + effect of benefit + impact of benefit*

Basis of assessment	**Item 4 Response**
Process of production Score 03	• The limestone and clay are run into a crusher in proportional/appropriate amount's and milled into fine powder. • The powder is pre heated in a rotary kiln using hot gases to burn off impurities. • The pre heated powder is mixed with water and let to run into a large rotary kiln and heated at about 1500^0C, during the process limestone decomposes to calcium oxide and carbon dioxide. Equation…… • Calcium oxide formed reacts with silicon dioxide and aluminium oxide to form calcium silicate and calcium aluminate respectively has a mixture of clinker. • Clinker formed is then cooled and ground into fine powdered in a rotary drum, during the grinding process *gypsum* is added to moderate or control the *setting of cement*. Cement is then bagged ready for sale, use and transportation.
Side effects of the production plant on environment, how it occurs and its mitigation Score 03	Release of toxic fumes containing mainly carbon dioxide and nitrogen oxides from the industry resulting to air pollution and increased greenhouse effect therefore increase in temperature and climatic changes in the area. This can be **mitigated** through: Fitting catalytic converters in the chimneys to remove nitrogen oxides to form nitrogen.

Benefits Score 03	• Source of employment opportunity to the locals, improved income therefore improved or better standards of living. *Social benefit + effect of benefit + impact of benefit*

Section: B part 2

Basis of assessment	Item 5 response	Score
Category of natural resource	***Renewable natural resources***: • These are easily replaced once used. • Resource that can be used over and over again without getting replenished. • Resources that do not easily get exhausted once used. **<u>Examples of renewable natural resources include</u>**: • Water bodies made up of water which is composed of hydrogen and oxygen. • Forests made up of tress composed of carbon, hydrogen and oxygen	**03** **Category, Reason, Example And composition**

Impact of exploitation of natural resources by man's activities on the environment	• Bush burning, promotes destruction of vegetation e.g. forests are cleared to create space for agriculture this results to increased greenhouse effect due to accumulation of carbon dioxide in the atmosphere thus leading to global warming, increased tempture and famine in the area. This can be mitigated through: Government putting up strict laws against forests encroachment	**O3** **Impact, how it occurs And Mitigation**
Benefits of natural resources	• Forests reduce on the greenhouse effect, since the trees use carbon dioxide gas during photosynthesis thus reducing its concentration in the atmosphere. • Forests are essential during the rain formation, since the tree carry out transpiration therefore forming water vapour that condenses to for rain. • Water bodies with ***running water*** are essential in the generation of hydroelectricity since it is able to drive turbines to generate electricity	**O2** **Any one given benefit with explanation**

Growth is painful.
Change is painful.
But nothing is as painful as staying stuck where you do not belong.