INTERSECONDARY SCHOOLS EXAMINATION SERIES (ISESE)

FORM TWO EXAMINATION
CHEMISTRY. MARKING GUIDE.

1. SECTION A (15 Marks)

List A	i	ii	iii	iv	v	vi	vii	viii	ix	x
List B	B	C	C	B	C	A	B	B	C	B

1@

2.

i	ii	iii	iv	v
G	E	A	C	F

1@

SECTION B (70 Marks).

3. a) Oxygen reaching is employed in modified atmosphere packaging to regulate the oxidation of food extending the shelf life and preserving the quality of perishable goods (4 marks).

b) i) Chemistry help me understand the interactions between different ingredients. (2@ marks).
ii) Ensuring the right balance of flavours and texture.
iii) Guides me in choosing the appropriate cooking methods to enhance or after the chemical composition.

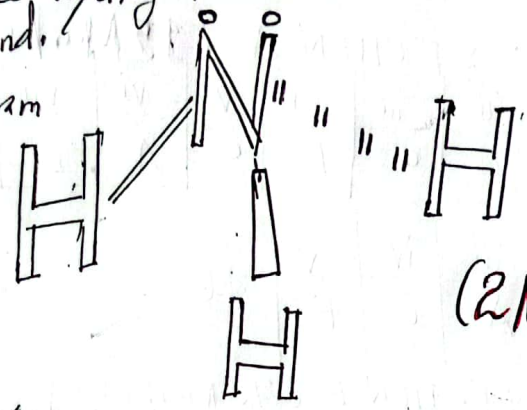
4. @ The researchers would consider (1)
i) Electronegativity (1)
ii) Electron affinity trends across period (1) (4 marks).
iii) Atomic radius. eg Element with specific electronegativity (1) may be chosen to ensure proper bonding.

b) Damaged electrical equipment poses a risk of electrical shock or fire.
I would immediately disconnect the equipment, report the issue to the supervisor and refrain from using the equipment until it is repaired or replaced. (6 marks).

5. i) Chlorine (Cl_2).
- Outer electrons, per chlorine atom (7x2 = 14 total).
- Central atom: None, both chlorine atom are equal.
- Arrangement: Each chlorine atom bonds with the other, forming single Cl–Cl bond.

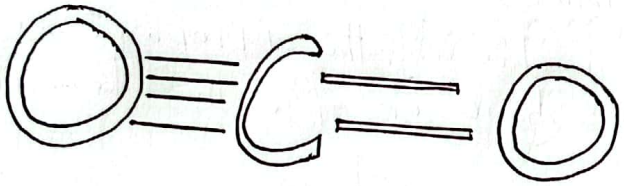
Diagram. Cl—Cl (2.5 marks)

ii) Ammonia (NH_3)
- Outer electrons: 1 from Nitrogen (N) 3 from hydrogen (H) (1+3*1)=4 total.
- Central atom: Nitrogen.
- Arrangement: Three hydrogen atoms bond with nitrogen with Single N–H bond.
- Bonds. 3 Diagram



(2 Marks).

iii) Carbon dioxide (CO_2).
- Outer electrons 4 from carbon (C) 6 from oxygen (O) (4+6*2=16 total).
- Central atom = Carbon.
- Arrangement: Two oxygen atoms bond with Carbon with double bond C=O bond.
- bond: 2 double bond.



(5 Marks)

6. a) (i) By clean the wire loop by dipping it in distilled water and holding it in the hotest part of the flame until it glows red. (1.5 Marks)
ii) Dip the loop into a small amount of distilled water and then touch it to a clean portion of one of the potato chip-sample. (1.5 marks).
iii) Introduce the wire loop in the hottest part of the non-luminous blue flame. (1.5 marks).
iv) Observe the colour of the flame (1.5 marks):
N.B The simple test is governed by use of bunsen burner, wire loops potatoes chips samples, distilled water.

b) To archieve a blue flame ideal for cooking follow these steps. (1 marks)
(i) Open the air vent on the stove (1 mark).
(ii) Adjust the gas flow (1 marks).

iii) Ensure proper ventilation. (4 marks).

7. (c) Choosing the right method (2 marks).

i) Garden shovel: Put can weaken the shovel; painting or powder coating should provide good protection for out door uses.

(ii) Cast iron skillet: Rust can contaminates food and damage the pan's seasoning proper seasoning with oil and regular use are crucial (2 Marks).

b(i) Water's cohesion allow it to stick to plant surfaces.

ii) Adhesion enables water to be absorbed by soil particles.

iii) The high specific heat capacity of water help maintain stable oil temperatures preventing extreme temperature (4 marks).

8. Solution

- Atomic masses of Silicon (A_r) = 28.0855
- Percentage of ^{28}Si = 92.23% with mass 27.97 a.m.u
- Let the required percentages of ^{30}Si with mass 29.9838 a.m.u be P_1.
- The percentages of Si with Mass 28.9865 a.m.u will be

$$P_2 = 100 - (P_1 + 92.23) = 7.77 - P_1$$

$$A_r = \frac{\sum (\text{Isotopic Mass} \times \text{Abudance})}{100}$$

$$= 28.055$$

$$= (27.976 \times 92.23) + (P_1 \times 29.9838) + \frac{(7.77 - P_1)\, 28.9865}{100}$$

$$2805.5 = 2580.23 + 225.23 - 28.9865P_1 + 29.9838P_1$$

$$P_1 = \frac{2805.5 - 2805.46}{0.9965}$$

$$P_1 = 0.04\% \text{ and } P_2 = 7.77 - 0.04)\%$$

$\therefore$ % of ^{30}Si and ^{29}Si are 0.04% and 7.73% $= 7.73\%$ (10 Marks)

9. (a) Group I elements, especially potassium play crucial role in maintaining cellular proces in plants.
i) Adding potassium – containing cpds to the soil enhances the availability of this essential nutrients (2 Marks).
ii) Promote overall plant growth and plant health. (2 marks).
iii). The reactivity of group I elements can also influence soil pH impacting solubility of other nutrients vital for plant growth. (2 marks).

(b) Data given
$\Phi_1 = 23.5^{\circ}C = 23.5 + 273 = 296.5K$.
$\Phi_2 = 67.2^{\circ}C = 273 + 67.2^{\circ}C = 340.2K$.
$m_s = 75g = 0.075kg$
$V = 15$ Litres $= 0.15m^3$
$M = \rho V = 1000 \times 0.15 = 150kg$
Heat Value of Biodiesel (E) = ?
From $E = \frac{mc\Delta\theta}{m} = \frac{150 \times 4.18 \times (340.2 - 296.5)K}{0.075}$

∴ Hence the heat value of Biodiesel = 365.33KJ/kg.

10. Scientific process dues:- (15 marks).
i) Observation: The quality analysis observes a deviation in the acidity of beverage.
ii) Hypothesis: possible hypothesis include a) Contamination of raw ingredients b) Variation in the production process.
iii) Question/Problem formulation: What is causing the deviation in the acidity of beverage.
iv) Experimentation: conduct experiment to test each hypothesis, This may involve
a) Analysing sample for raw ingredients to - contaminants.
b) Monitoring and controlling.
v) Data collection: Gathering data from experiment.
vi) Analysis: Analysis the data to determine whether any deviation.
vii) Conclusion: Identify the root cause of the acidic deviation.
viii) Corrective actions:-
a) If Contamination is found, improving quality control measures for raw ingredients;
b) If there are variations in the production process implements light on process control.