**Activity One:** Questions of Comprehension. From what we have already studied provide answers to the following questions. **(7pts)**

1. Give a full definition to **materials chemistry** explaining its importance and utility in the modern innovation of material sciences. **(1.5pts)**
2. Materials science is a field of engineering. It involves analyzing the properties and structure of all solid materials. It also involves the discovery and development of new solid materials. Materials science is used to analyze the properties and structure of solid materials. It is also used to discover and design new solid materials and to apply these materials to create technological advances in the day-to-day lives of humans and society.
3. Materials chemistry focuses on the design, synthesis, characterization, and application of materials with tailored properties. This interdisciplinary field bridges chemistry, physics, and engineering to solve challenges in energy, healthcare, electronics, and sustainability.

One of the primary goals of materials chemistry is to manipulate atomic and molecular structures to produce materials with specific functionalities. These can range from advanced polymers and ceramics to nanostructures and quantum materials. Key concepts include crystallography, surface chemistry, and molecular interactions.

1. Give four examples of materials chemistry application in modern science**.(2pts)**
2. Energy Storage and Conversion.
3. Catalysis.
4. Biomaterials.
5. Electronics.
6. State the five barriers of communication. **(2.5)**
7. Physical Barriers.
8. Emotional Barriers.
9. Cultural Barriers.
10. Perceptual Barriers.
11. Language Barriers.
12. What is the importance of academic communication? **(1pt)**

Academic Success: effective communication is crucial for academic success. Students with strong communication skills can express their ideas clearly and concisely, making it easier for them to participate in class discussions, ask questions, and seek help when needed.

**Activity Two**: Translate the following passage into English. **(3pts)**

Couleur due au champ cristallin

Un ion dans un cristal peut être exposé à un champ électrique (champ cristallin) et, par conséquent, ses niveaux énergétiques sensibles aux interactions électrostatiques peuvent être modifiés de sorte que l’absorption se produise dans le visible (ions des métaux de transitions; transitions électroniques entre des niveaux séparés des orbitales d).Exemple: les ions de chrome dans le rubis rouge (Al2O3 dopéde ~ 1% Cr3+au centre d’un octaèdre avec liaisons Cr-O assez ioniques), l’absorption du violet et de l’orange conduit à une apparence rouge, ce qui coïncide avec l’émission du rouge (fluorescence).

Colour due to crystalline field

An ion in a crystal can be exposed to an electric field (crystalline field) and, therefore, its energy levels sensitive to electrostatic interactions can be modified so that absorption occurs in the visible (transition metal ions; electronic transitions between separate levels of d-orbitals). Example: chromium ions in red ruby (doped Al2O3 ~ 1% Cr3+ at the centre of an octahedron with fairly ionic Cr-O bonds), the absorption of violet and orange leads to a red appearance, which coincides with the emission of red (fluorescence).

**Activity Three**: Complete the following definition with the right words. **(4pts)**

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| --- |
| **resins- phenols- resistance- cross-linkages- copolymerizing- Epoxy- viscous- adhesives-**  **polyamines- synthetic- polymerization- electrical- catalysts- hardened- agents- contain** |

……………..resins is a …………..resins produced by …………… epoxide compounds with……………. . They……………–O– linkages and epoxide groups and are usually ………….liquids. They can be ……………by addition of……….., such as……………, that form……………. . Alternatively, …………..may be used to induce further ………….of the resin. Epoxy……….….. are used in …………….. equipment and in the chemical industry (because of…………… to chemical attack). They are also used as………………….

**Epoxy** resins is a **synthetic** resins produced by **copolymerizing** epoxide compounds with **phenols**. They **contain** –O– linkages and epoxide groups and are usually **viscous** liquids. They can be **hardened** by addition of **agents**, such as **polyamines**, that form **cross-linkages**. Alternatively, **catalysts** may be used to induce further **polymerization** of the resin. Epoxy **resins** are used in electrical **equipment** and in the chemical industry (because of **resistance** to chemical attack). They are also used as **adhesive**s.

**Activity Four**: Writing task. Reorder the following sentences to get meaningful passages. **(6pts)**

1. These are critical in processes like/ and nanoparticles enable/ hydrogen production and CO₂ capture./ Catalysts based on materials / efficient chemical reactions./such as zeolites, metal-organic frameworks (MOFs),/

Catalysts based on materials such as zeolites, metal-organic frameworks (MOFs), and nanoparticles enable efficient chemical reactions. These are critical in processes like hydrogen production and CO₂ capture.

1. medical applications—like / are pivotal in advancing healthcare./ bio-compatible polymers or/ Materials designed for / hydroxyapatite for bone regeneration—/

Materials designed for medical applications—like bio-compatible polymers or hydroxyapatite for bone regeneration—are pivotal in advancing healthcare.

1. a driving force behind the/ smaller, and more efficient devices./ Materials chemistry is / evolution of electronic technologies,/enabling the development of faster,/

Materials chemistry is a driving force behind the evolution of electronic technologies, enabling the development of faster, smaller, and more efficient devices.

1. components tailored to / manipulating the atomic and/ researchers can design / specific electronic applications./By understanding and/molecular properties of materials,/

By understanding and manipulating the atomic and molecular properties of materials, researchers can design components tailored to specific electronic applications.