Developing Coatings, Adhesives, and Sealants for Industrial Applications

Part 1: Dialogue

Characters: Sarah (Chemical Engineer), David (Materials Scientist)

Sarah: David, I've been working on a new industrial adhesive, but I'm struggling to improve its **adhesion strength** on metal surfaces.
David: Have you considered modifying the **surface treatment**? Proper surface preparation can significantly enhance bonding performance.
Sarah: That's a good point. I was thinking of trying plasma treatment or a chemical primer before application.
David: Both could work. Also, adjusting the **curing process** might help. Are you using heat, UV, or a two-part curing system?
Sarah: Right now, we're using a heat-cured system, but it takes longer than expected. Maybe switching to a UV-curing process could speed things up.
David: That could be a good solution. Another factor is the **crosslinking** density of the polymer. Higher crosslinking often results in better durability and strength.
Sarah: True. I'll experiment with increasing the crosslinking agents to see if it improves performance.
David: Also, what about the polymerization method? Have you tried **emulsion polymerization**? It can produce stable adhesives with high flexibility.
Sarah: I haven't yet, but I'll run some tests. If it enhances stability and adhesion, it might be the best approach.
David: Sounds like a great plan. Let's review the test results next week and decide on the final formulation.
Sarah: Agreed! I'll keep you updated on any breakthroughs.

Part 2: Comprehension Questions

1. What issue is Sarah facing with her industrial adhesive?

- (A) It is too expensive to produce.
- (B) It has poor adhesion strength on metal surfaces.
- (C) It is not compatible with plastic materials.
- (D) It degrades too quickly in sunlight.

2. What method does David suggest to improve adhesion?
   - (A) Changing the polymer base
   - (B) Increasing the production temperature
   - (C) Modifying the surface treatment
   - (D) Adding more solvents
3. Why does Sarah consider switching to a UV-curing process?
   - (A) It speeds up the curing process
   - (B) It lowers the cost of production
   - (C) It improves the color of the adhesive
   - (D) It enhances heat resistance
4. What polymerization method does David suggest Sarah try?
   - (A) Bulk polymerization
   - (B) Emulsion polymerization
   - (C) Radical polymerization
   - (D) Step-growth polymerization

Part 3: Key Vocabulary

- **Crosslinking** – 架橋結合
- **Adhesion strength** – 接着強度

- **Curing process** – 硬化プロセス
- **Emulsion polymerization** – 乳化重合
- **Surface treatment** – 表面処理

Part 4: Answer Key

1. **What issue is Sarah facing with her industrial adhesive?**
   ✅ **(B) It has poor adhesion strength on metal surfaces.**
2. **What method does David suggest to improve adhesion?**
   ✅ **(C) Modifying the surface treatment.**
3. **Why does Sarah consider switching to a UV-curing process?**
   ✅ **(A) It speeds up the curing process.**
4. **What polymerization method does David suggest Sarah try?**
   ✅ **(B) Emulsion polymerization.**