Set 9 Exercise Questions

Light, Color and Scattering (Chapters 26, and 27)

1. (i) Explain in detail how electromagnetic waves can be created by (i) an electric charge and (ii) by an atom? (iii) List the types of electromagnetic waves, from low to high frequency, that are in the electromagnetic spectrum?

2. (i) Atoms can emit photons (light particles) or absorb them. Explain how this is done. (ii) Explain how blue, green and red light can be created by atoms?

3. When astronomers observe a supernova explosion in a distant galaxy, they see a sudden, simultaneous rise in visible light and other forms of electromagnetic radiation. Is this evidence to support the idea that the speed of light is independent of frequency? Explain.

4. Using the spring model of the atom, explain how (i) UV and IR light frequencies are absorbed by glass, however, (ii) glass is transparent for visible light frequencies? Explain why.

5. (i) On a red rose tree, explain why roses are red and leaves are green. (ii) Fire engines used to be red. Now many of them are yellow-green. Why the change?

6. (i) What is the actual color of the Sun? Explain. (ii) Now explain why the Sun appears yellow here on earth in terms of light scattering and reflection.

7. (i) Why is the sky blue? (ii) Why is the sky red at sunsets?

8. (i) Why can't we see stars in the daytime? (ii) Can stars be seen from the moon in the "daytime" when the sun is shining?

9. (i) What is the color of the sun? Why is the color of the sun on earth yellow? (ii) Fire engines used to be red, however, now many of them are yellow-green. Why the change?

10. Red sunrises occur for the same reason as red sunsets. But sunsets are usually more colorful than sunrises - especially near cities. What is your explanation?