

NAN 242

Quiz 1 - Sample Questions

1. What is a light emitting diode? How is the light generated?
2. How are energy bands formed in a crystal?
3. What is the difference between an insulator and a conductor from an energy band point of view?
4. Define the Fermi level.
5. Estimate the size of an Aluminum atom (atomic weight = 27, density = 2.7gr/cm³)
6. Define the mean free path for an atom.
7. What is the mean free path of Aluminum vapor at a temperature of 300 K and pressure of 10⁻⁶ Torr?
8. Define the Knudsen number. What is its significance?
9. If we attach a 500 L/s pump to a chamber with a 500 L/s conductance port, what is the effective pumping speed from the chamber?
10. Give an example of an adsorption vacuum pump and a gas transfer pump.
11. How does a diffusion pump work?
12. How does an ion pump work?
13. What is the advantage and disadvantage of a turbomolecular pump?
14. What are the three parts of a vacuum valve?
15. Describe the operation of an ion gauge.
16. Briefly describe vacuum evaporation.
17. How long would it take to deposit a 2000 Angstrom thick gold film over a 20 cm² area in 50 sec using a 1 cm² source at 1065 °C? (atomic weight = 197, density = 19.3gr/cm³, vapor pressure = 1.78x10⁻⁶ Torr@1065°C)
18. Which evaporation source is more suitable for depositing thicker films?
19. What is the gold standard method for thickness measurement?
20. Outline the steps for vacuum evaporation.