

Advanced Nanotechnology Milestones

Nanotechnology · Practice Test · 20 Questions

1. In his 1959 lecture 'There's Plenty of Room at the Bottom', what specific theoretical limit did Richard Feynman suggest for the size of a motor?

- A) 1/64 of an inch
- B) 1/100 of an inch
- C) 1/256 of an inch
- D) 1/500 of an inch

2. The term 'nanotechnology' was first coined in 1974 by which researcher at the Tokyo University of Science?

- A) Eric Drexler
- B) Norio Taniguchi
- C) Sumio Iijima
- D) Richard Smalley

3. What is the exact atomic number of the element whose 1985 discovery, in the form of C60 buckminsterfullerene, launched the era of fullerene research?

- A) 5
- B) 6
- C) 7
- D) 8

4. The 1981 invention of the Scanning Tunneling Microscope (STM), which allowed for the imaging of individual atoms, earned its inventors which fraction of the 1986 Nobel Prize in Physics?

- A) 1/4
- B) 1/3
- C) 1/2
- D) Full prize

5. In 1991, Sumio Iijima published his seminal paper in Nature describing the discovery of what structure?

- A) Multi-walled carbon nanotubes
- B) Single-walled carbon nanotubes
- C) Quantum dots
- D) Graphene sheets

6. In 1959, Richard Feynman offered a prize of \$1,000 for the first person to build an electric motor that fit into what volume?

- A) 1 cubic millimeter
- B) 1/64 cubic inch
- C) 1 cubic micrometer
- D) 1/1000 cubic centimeter

7. What is the diameter, in nanometers, of the DNA double helix that serves as a common reference for biological nanotechnology?

- A) 0.5 nm
- B) 1.0 nm
- C) 2.0 nm
- D) 5.0 nm

8. The National Nanotechnology Initiative (NNI) was officially signed into law as a federal program by which U.S. President in 2003?

- A) Bill Clinton
- B) George W. Bush
- C) Barack Obama
- D) Ronald Reagan

9. What is the specific wavelength (in nanometers) typically used for the excitation of standard CdSe (Cadmium Selenide) quantum dots to achieve blue fluorescence?

- A) 300-400 nm
- B) 400-500 nm
- C) 500-600 nm
- D) 600-700 nm

10. In 1986, K. Eric Drexler published his book 'Engines of Creation', which popularized the concept of molecular nanotechnology. How many chapters does this book contain?

- A) 8
- B) 10
- C) 12
- D) 14

11. A 'nanometer' is defined as exactly what fraction of a meter?

- A) 10^{-7}
- B) 10^{-8}
- C) 10^{-9}
- D) 10^{-10}

12. In 1989, Don Eigler of IBM famously used an STM to spell out the 'IBM' logo using how many individual Xenon atoms?

- A) 35
- B) 42
- C) 50
- D) 64

13. What is the approximate tensile strength (in GPa) of a defect-free single-walled carbon nanotube?

- A) 10-20 GPa
- B) 50-100 GPa
- C) 150-200 GPa
- D) 500+ GPa

14. What is the specific surface-area-to-volume ratio of a sphere with a radius of 1 nm?

- A) 1 m^{-1}
- B) 2 m^{-1}
- C) 3 nm^{-1}
- D) 6 nm^{-1}

15. The 'Feynman Prize' for nanotechnology was established in what year?

- A) 1990
- B) 1993
- C) 1997
- D) 2000

16. What is the approximate bond length (in nanometers) of a carbon-carbon covalent bond in a graphene sheet?

- A) 0.142 nm
- B) 0.242 nm
- C) 0.342 nm
- D) 0.442 nm

17. In 2004, Andre Geim and Konstantin Novoselov isolated graphene using what mechanical method?

- A) Chemical Vapor Deposition
- B) Scotch tape exfoliation
- C) Laser ablation
- D) Molecular beam epitaxy

18. How many carbon atoms are contained in a standard C60 Buckminsterfullerene molecule?

- A) 40
- B) 50
- C) 60
- D) 70

19. What is the approximate limit of resolution (in nanometers) of a high-end commercial Transmission Electron Microscope (TEM)?

- A) 0.05 nm
- B) 0.5 nm
- C) 5 nm
- D) 50 nm

20. The first 'nanocar' (a molecular machine) was synthesized by James Tour's group in what year?

- A) 2003
- B) 2005
- C) 2007
- D) 2009