

1. For the packing arrangement of the body-centered cubic (BCC), what is the space actually occupied by spheres? (a) 74%, (b) 68%, (c) 100%, (d) 76.54%. (Write down (a), (b), (c) or (d), 5%) Please draw and describe BCC, and calculate its space. (15%)
2. Diamond is the hardest naturally occurring substance because the structure is stabilized by (a) covalent bonds, (b) metallic bonds, (c) ionic bonds, (d) van der Waal force. (Write down (a), (b), (c) or (d), 5%) What are the differences between (b) and (c). (15%)
3. A crystal with *Schottky* defects, in which there are (a) atoms at inappropriate sites, (b) ions at inappropriate sites, (c) vacant sites, (d) close-packed structures. (Write down (a), (b), (c) or (d), 5%) Please explain the structure of (d) and give an example fitted with (d). (15%)
4. There are four kinds of biological tissues: (a) Femur bone, (b) Cruciate ligaments, (c) Quadriceps tendon, and (d) Rectus femoris muscle. Please use *stress-strain curves* to describe their mechanical properties. (20%)
5. Biomedical materials are usually man-made substances. Biological materials are from human, animals or biological organisms. These two types of materials are currently used for medical purposes. Please introduce two biomedical materials and two biological materials, and shortly describe their drawbacks. (20%)