

Diamond and Graphite Properties Analysis

<https://gemini.google.com/app/4a17b6a6256ed21c>

Response: Statements **(a)** and **(b)** are correct.

Statement Analysis

- **(a) Correct:** In diamond, each carbon atom is sp^3 hybridized and bonded tetrahedrally to four other carbon atoms, forming a rigid 3D covalent network lattice.
 - **(b) Correct:** Graphite consists of 2D hexagonal planar sheets (sp^2 hybridized carbon) bonded internally by strong covalent bonds, but adjacent layers are held together by weak van der Waals forces. These layers can easily slide over one another, making graphite soft and an effective dry lubricant.
 - **(c) Incorrect:** Diamond is an excellent conductor of heat (due to strong covalent bonding facilitating phonon transport), but a poor conductor of electricity because all valence electrons are localized in single σ covalent bonds with no free delocalized electrons.
 - **(d) Incorrect:** Both graphite and diamond have exceptionally high sublimation/melting points (around 4000 K), but diamond has a slightly higher melting point than graphite due to its 3D network of covalent bonds throughout the structure, whereas graphite's inter-layer forces are much weaker.
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