

Hydrogen bonding

41. (b) Ethyl alcohol has a intermolecular hydrogen bond.

42. (c) H_2SO_4

Explanation:

Sulphuric acid (H_2SO_4) has the **highest boiling point** because it forms **extensive hydrogen bonding** due to the presence of two $-\text{OH}$ groups and strong intermolecular forces.

In contrast, HCl and HBr are gases at room temperature, and HNO_3 has fewer hydrogen bonds compared to H_2SO_4 .

43. (b) HCl contain weak covalent bond.

44. (c) 3 – 10 kcal

Explanation:

The energy of a **hydrogen bond** typically lies in the range of **3 to 10 kilocalories per mole (kcal/mol)**.

It is **stronger than van der Waals forces** but **weaker than covalent bonds** (which are usually 50–100 kcal/mol).

45. (c) Due to intermolecular hydrogen bonding water molecules come close to each other and exist in liquid state.

46. (b) Due to greater resonance stabilization.

47. (d) $\text{C}_2\text{H}_5\text{OH}$ will dissolve in water because it forms hydrogen bond with water molecule.

48. (b) In ice cube all molecules are held by inter molecular hydrogen bond.



49. (d) Hydrogen bonding is developed due to inter atomic attraction so it is the weakest.
50. (d) Hydrogen sulphide

Explanation:

Hydrogen sulphide (H_2S) does **not form hydrogen bonds** because the **electronegativity of sulphur (2.5)** is not high enough to create a strong dipole with hydrogen.

In contrast:

- **Water (H_2O), Glycerol, and Hydrogen fluoride (HF)** have highly electronegative atoms (O or F), enabling strong **H-bond formation**.

