Calculate energy of a reaction using bond energies

- Bond energy (Bond enthaly) is the amount of energy required to break 1 mole of a particular covalent bond in the gaseous state in to gaseous atoms(under standard thermodynamic conditions).It is a measure of the strength of a bond.
- Symbol of bond energy is E.

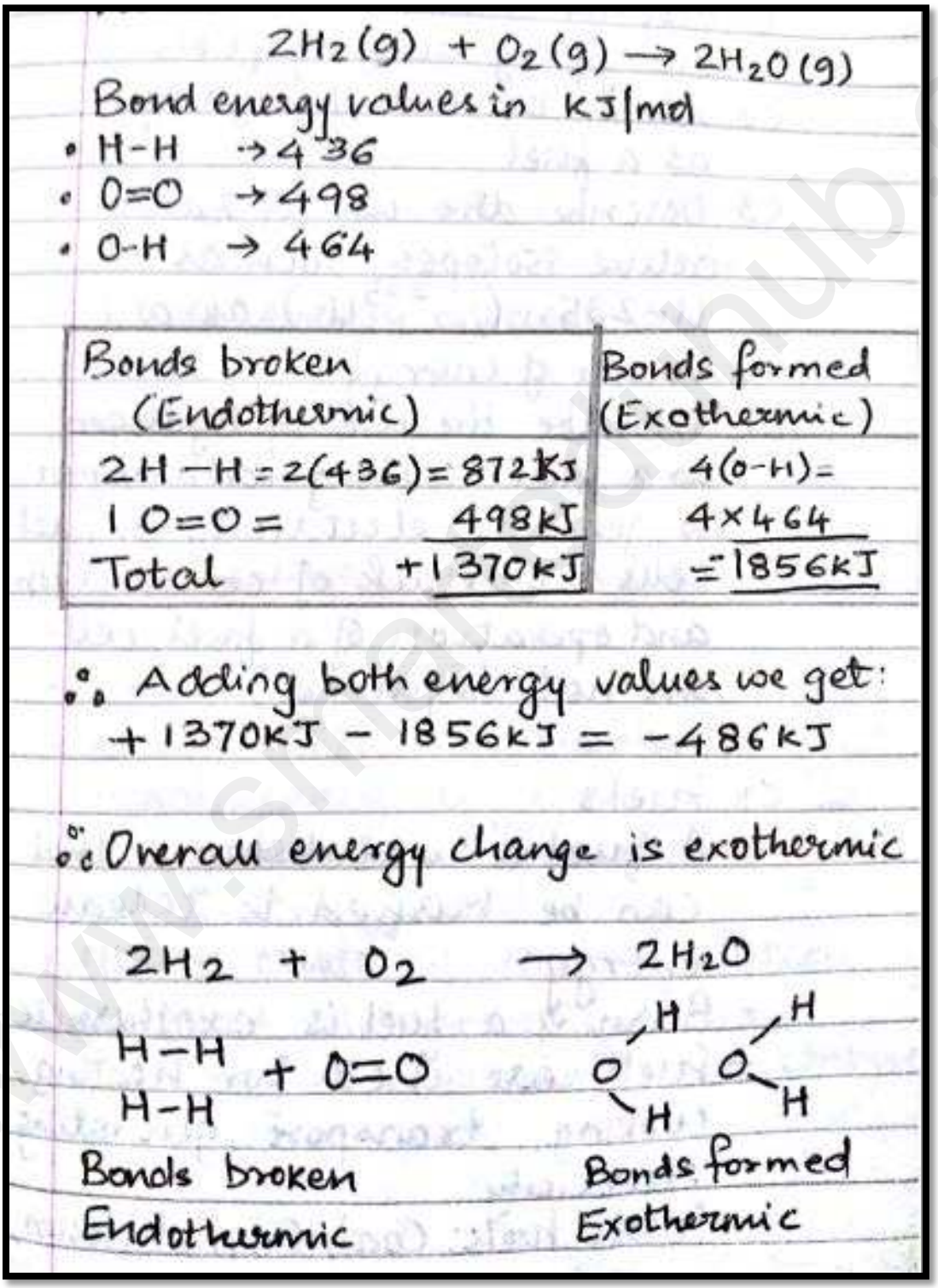
Example:

E(H-H)=+436kJ/mol. It means that 436kJ of energy are needed to break the bonds in 1 mole of hydrogen molecules.

- Bond energies are always +ve. This is because they refer to the bonds being broken.

Application based questions showing you how to calculate energy changes in a reaction.

Question: Calculate the energy in the reaction:



$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$

Bond energy values in kJ/mol

- H-H → 436
- O=O → 498
- O-H → 464

Bonds broken (Endothermic)		Bonds formed (Exothermic)
2 H−H = 2(436) =	872 kJ	4(O-H) =
1 O=O =	498 kJ	4 × 464
Total	+1370 kJ	= 1856 kJ

∴ Adding both energy values we get:

+1370 kJ − 1856 kJ = −486 kJ

∴ Overall energy change is exothermic

$2H_2 + O_2 \rightarrow 2H_2O$

H−H + H−H + O=O

Bonds broken — Endothermic

Bonds formed — Exothermic