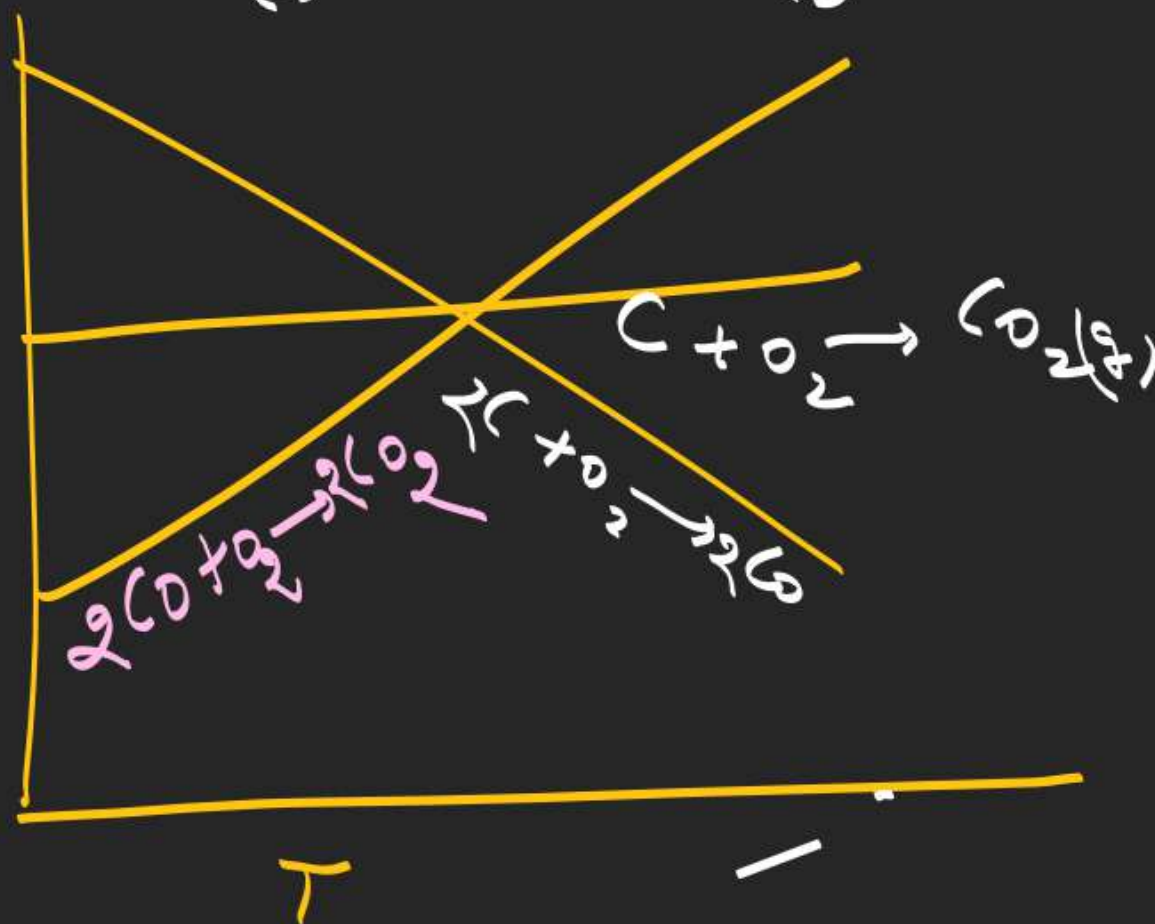


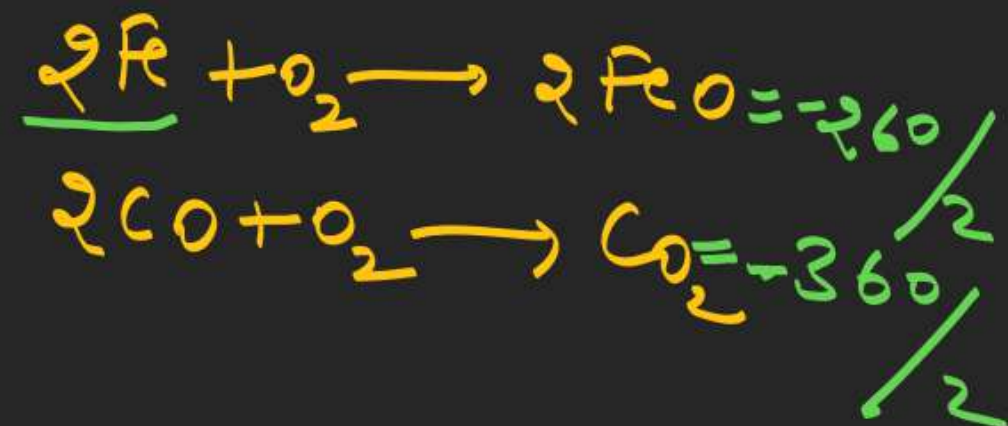
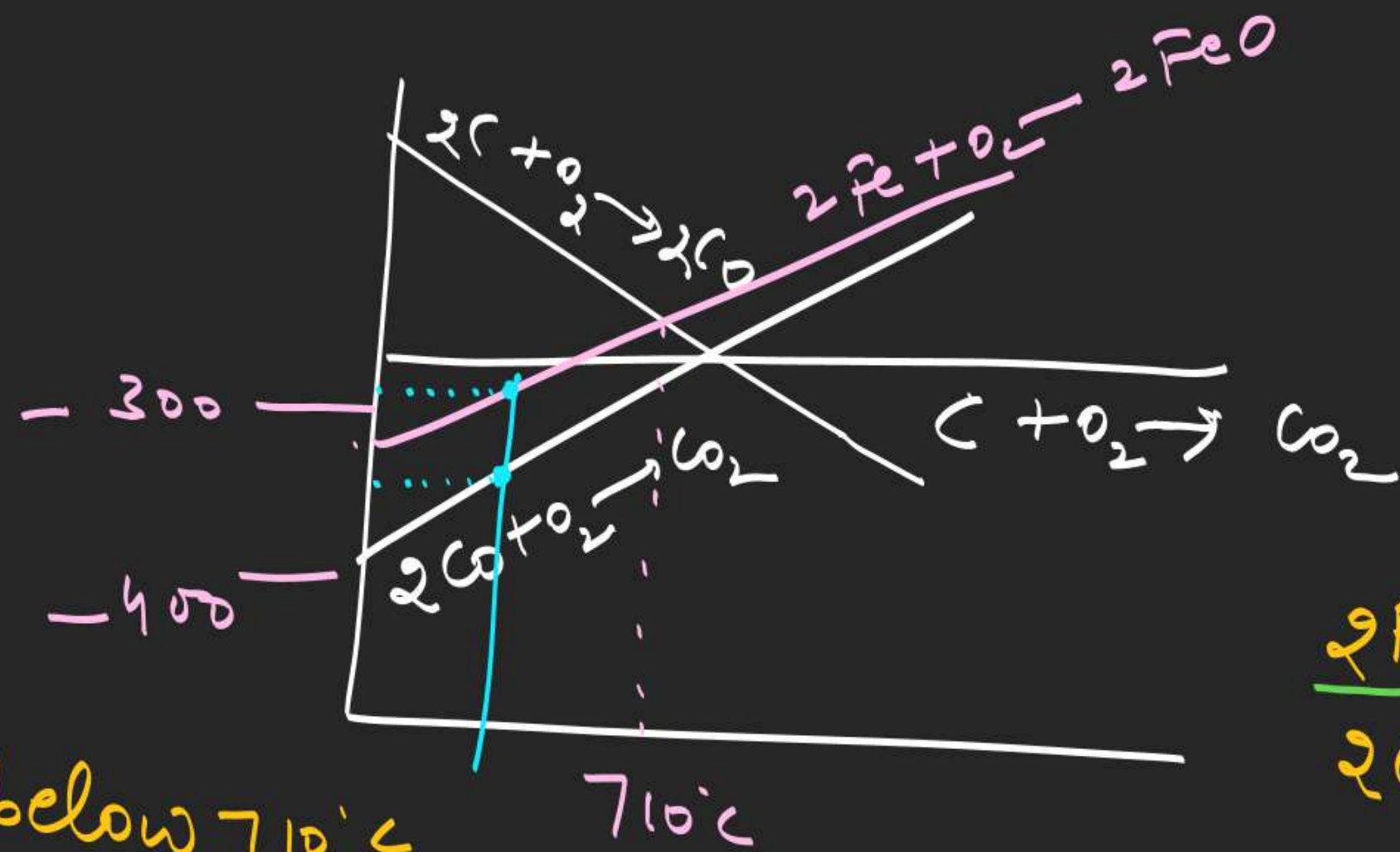
Ellingham Dia.



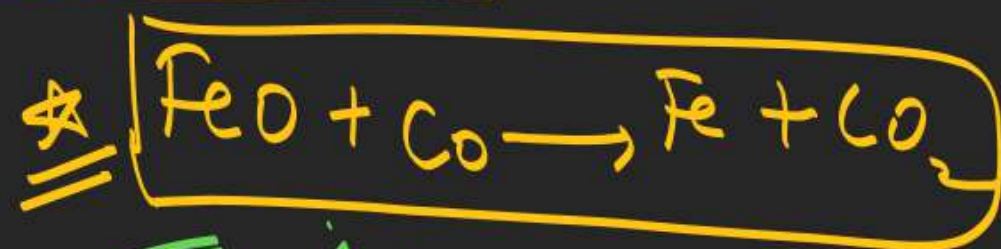
$$\Delta G = \Delta H - T\Delta S$$

$$\Delta S = \frac{P}{T} - R \ln K$$





below 710°C



$$\Delta G = +\frac{260}{2} - \frac{360}{2}$$

$\Delta G = \text{-ive}$

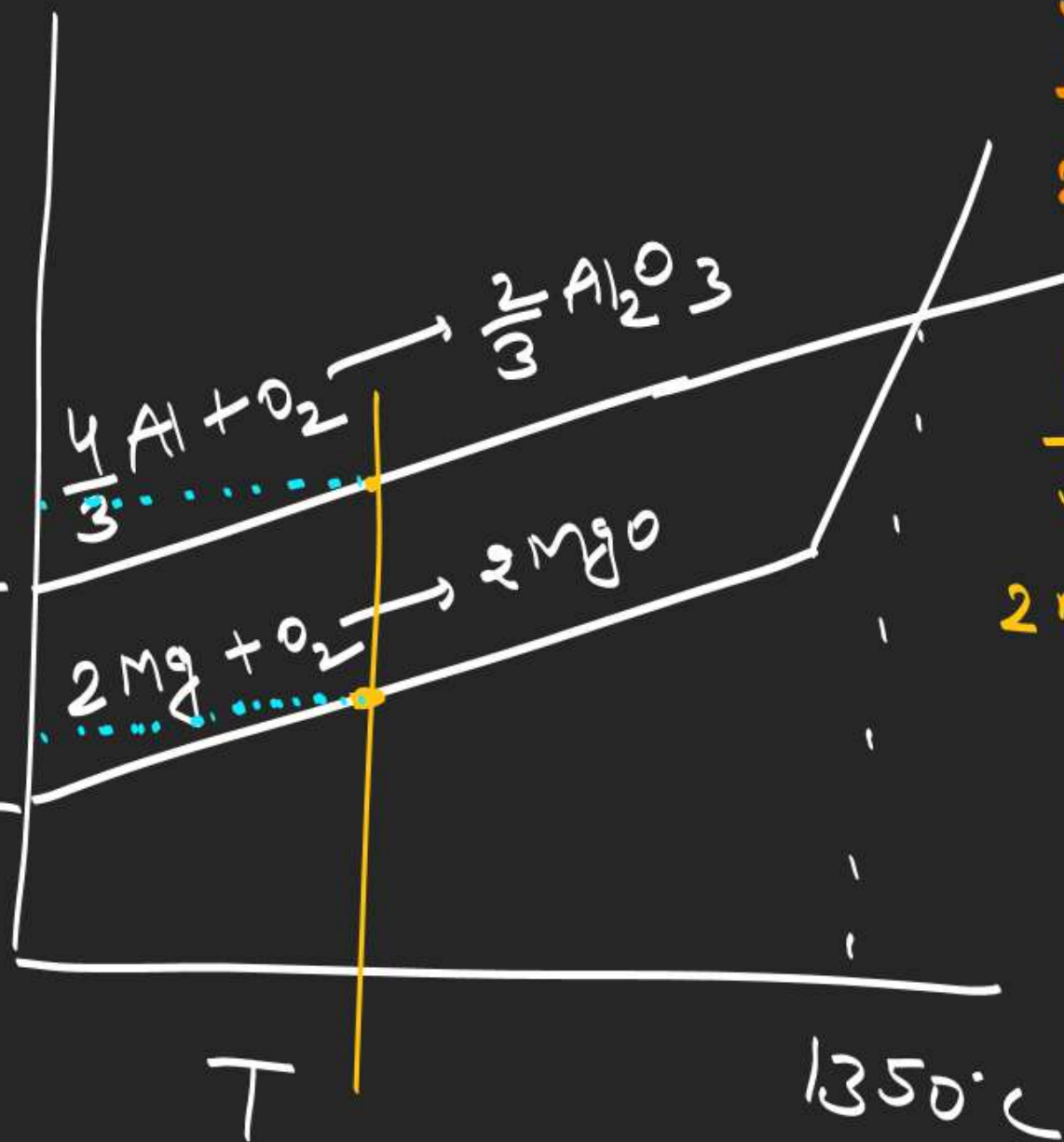
below 1350°C



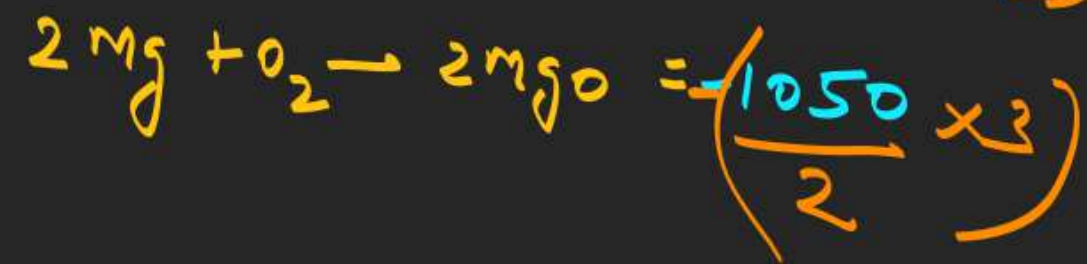
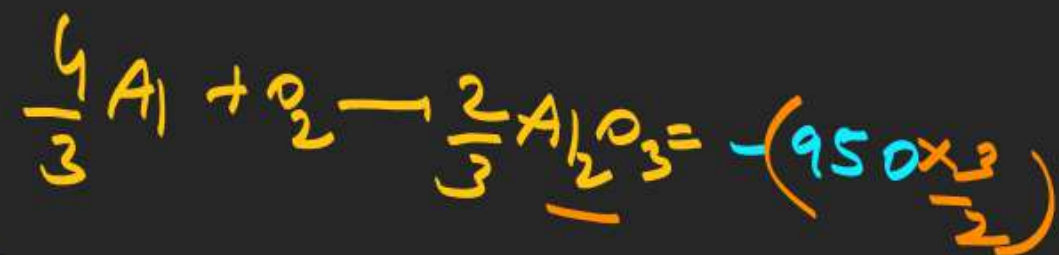
$$\Delta G = \left(\frac{950 \times 3}{2} \right) - \left(\frac{1050 \times 3}{2} \right)$$

$$= \Delta G = -150$$

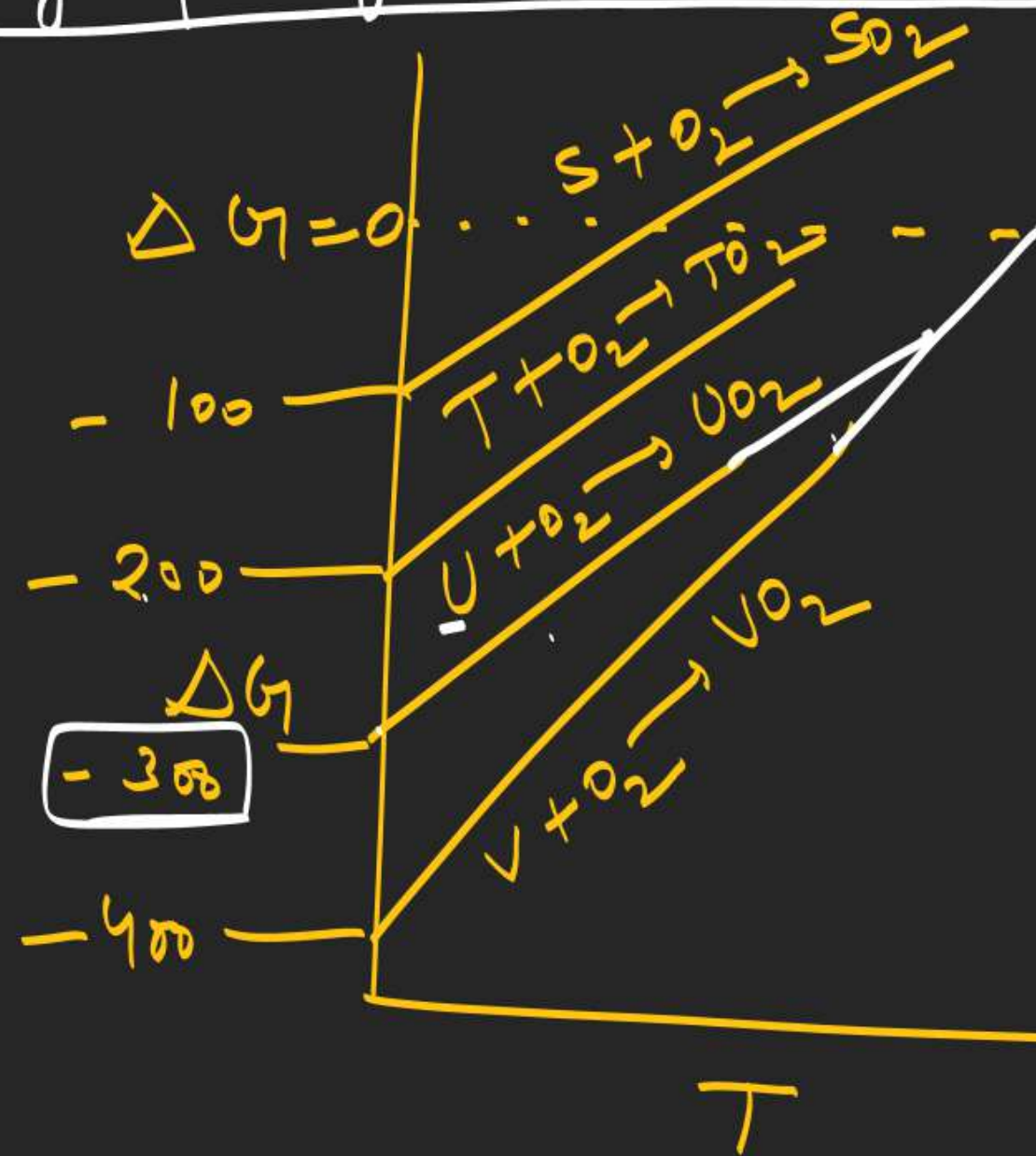
-150



$$\begin{aligned} \frac{4}{3} \text{Al} &\longrightarrow -950 \\ 2 \text{Al} &\longrightarrow \frac{950 \times 3}{4} \\ 2 \text{Al} &\longrightarrow \frac{950 \times 3 \times 2}{4} \end{aligned}$$



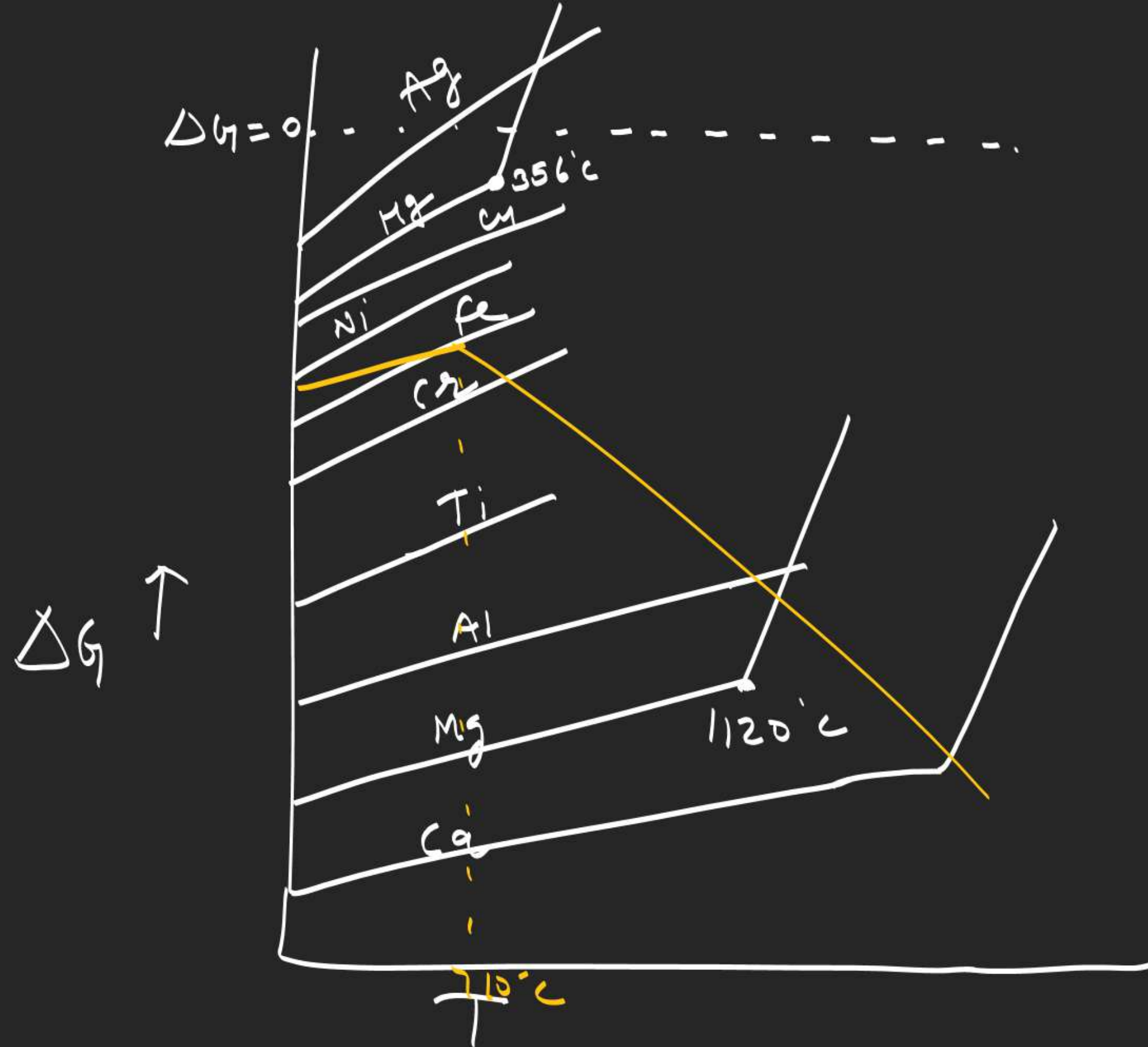
graphs for metal to metal oxide



Which of the following metal oxide decompose first
 SO_2

② Which of the following metal oxide easily reduced by U metal
 TO_2, SO_2

③ Which of the following metal oxide will reduced by U metal only at high temp.
 VO_2



① $\Delta G/T$ lines upwards
because when $T \uparrow \Delta G \uparrow$

② $\Delta G/T$ all line follow
straight line unless
material melt or vapourise
(example) $Hg \rightarrow HgO$ line (vap) (356°C)
 $Mg \rightarrow MgO$ line (vap) (1100°C)

- ① $\Delta G/T$ Diagram Called Ellingham Dia.
- ② graphs are given for metal to metal oxide
metal to metal sulphide
metal to metal Halide

but above graphs are given for metal to metal oxide.

$$\Delta S = P_{(g)} - R_{(g)}$$



$$\Delta S = 0 - 1$$


$$= \underline{\underline{-ive}}$$

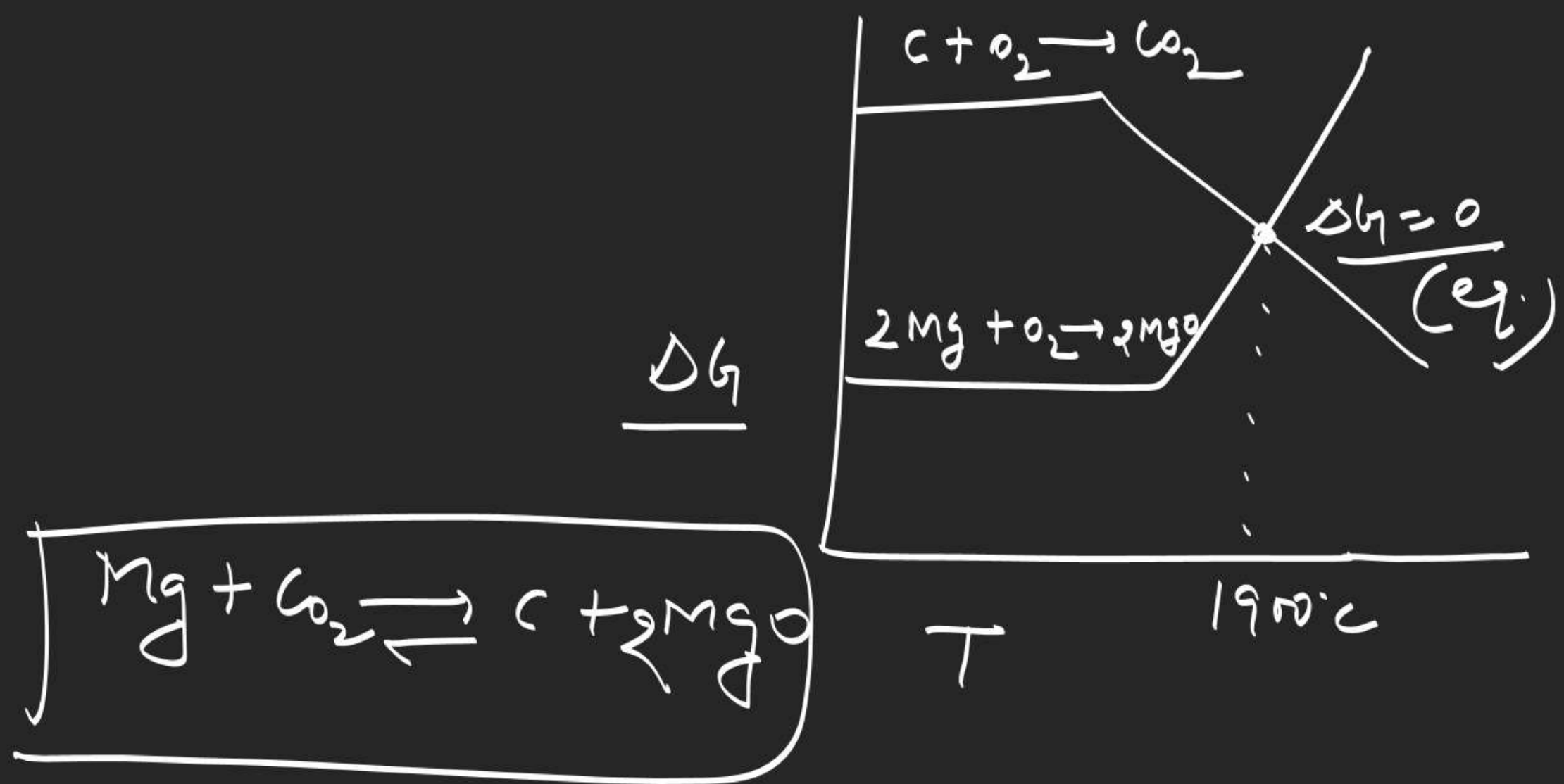
$$\Delta G = \Delta H - T\Delta S$$

$$T \uparrow \Delta G \uparrow (\text{because } \Delta S = \text{ive})$$

- Metal can reduce oxide of other metal which lie above it in Ellingham diagram
- Carbon is good reducing agent for metal oxide but at high temp. it can form carbide with some metals

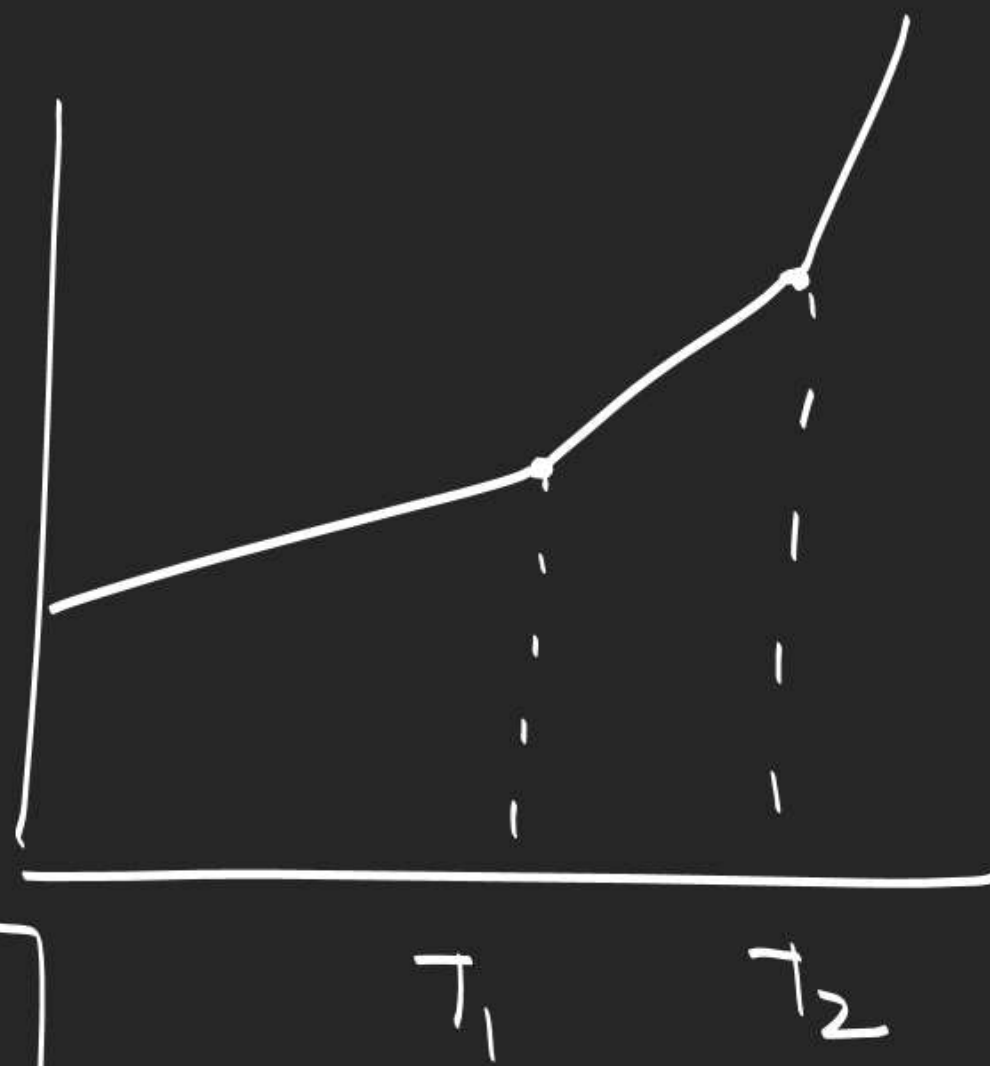
Ques hydrogen is good reducing agent
but it is not widely used in
metallurgical process.

- ① Hydrogen graph above from many metal
- ②  H_2 line runs parallel with
many metals
- ③ Hydrogen can form hydride with many metal
- ④ Hydrogen gives explosive reaction with O_2 at
high temp.



que Why Fe_2O_3 not reduced by
C at room temp.

Ans - Reaction req. certain amount
of activation energy to
start.



$$T_1 = M \cdot P$$
$$T_2 = B \cdot P$$

Chromatography

adsorbent

