Answer on Question #77036 - Chemistry - Physical Chemistry

Question:

For the reaction:

3C(s) + 4H2(g) = C3H8(g),
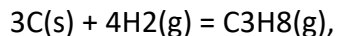
ΔSo = -269 J/K and ΔHo = -103.8 kJ.

Calculate the equilibrium constant at 25 oC for the reaction above.

A) 1.0

B) 3.7 x 1019

C) 1.4 x 104

D) 2.1 x 1031

E) 1.0 x 1017

Solution:

ΔG = -RTlnK;

ΔG = ΔH - TΔS;

ΔG = -103.8 - (-0.269 * (273 + 25)) = -103.8 - (0.269 * 298) = -103.8 - (-80.162) = -23.638 kJ =
= -23638 J.

lnK = - ΔG/RT = 23638/(8.314*298) = 9.54;

K = 1.4 * 10^4.

So correct answer – C)

Answer: C) 1.4 x 104