(每題20分)

1. Calculate the adiabatic flame temperature for CO burned with 20% excess air (20% oxygen and 80% nitrogen) at 300 K.

	△H (kJ/mol)	△G (kJ/mol)	d (J/Kmol)	e (J/K^2mol)	f(JK/mol)
O_2	0	0	30	4.2×10^{-3}	-1.7×10^{-5}
CO	-110.5	-137.2	28	4.1×10^{-3}	-4.6×10^{-4}
CO_2	-393.5	-394.4	44	8.8×10^{-3}	-8.6×10^{-5}

$C_p = d + eT + fT^{-2}$

2. Give possible reactions involved in the formation of photochemical smog.
3. A hazardous waste incinerator is to burn 100 kg/hr of a PCB (polychlorinated biphenyl) waste that is 20% PCB and 80% organic solvents. In a trial run the concentration of PCB in the emission is measured as 0.02 g/m^3, and the stack gas flow rate is 40 m^3/min. No PCB is detected in the ash. What removal efficiency (destruction of PCB) does the incinerator achieve?
4. An industrial waste water treatment process uses activated carbon to remove color from the water. The color is reduced as a first-order reaction in a batch adsorption system. If the rate constant (k) is 0.35 day^{-1}, how long will it take to remove 90% of the color?
5. Derive a rate equation from the following reaction mechanism of the iodine-catalyzed decomposition of CH_3CHO: (a) $I_2 \rightarrow 2I$ (b) $I + CH_3CHO \rightarrow HI + CH_3CO$ (c) $CH_3CO \rightarrow CH_3 + CO$ (d) $CH_3 + HI \rightarrow CH_4 + I$ (e) $2I \rightarrow I_2$.