Ch 8

50) :C≡O: + Cl–Cl → Cl–C(Cl)(Cl)–C=O

1 C≡O (1046) 1 Cl–Cl (242) 2 Cl–C (339) 1 C=O (745)

$\Delta_{rxn}H^0 \sim -\sum_{\text{Bonds made}} + \sum_{\text{Bonds broken}} \approx +135\ kJ/mol\ rxn$

This reaction is reactant-Favored.

51) $OF_2(g) + H_2O(g) \longrightarrow O_2(g) + 2HF(g)$

O–F (X) 2 O–H (463) O=O (498) 2 H–F (565)

$\Delta_{rxn}H^0 \sim -318\ kJ/mol\ rxn$ Depends on O–F Bond Energy

$-318 = (-498 - 2\times565 + 2X + 2\times463)$

$\frac{-318 + 498 + 2\times565 - 2\times463}{2} = X = 192\ kJ/mol$ O–F bond.

52) $O{=}O{-}O + O\cdot \rightarrow 2\,O{=}O \quad \Delta_r H^0 = -394\ kJ/mol\ rxn$

O=O 498 O–O 146 2(O=O) 498 $\sum$ Bond Energies = $-352\ kJ/mol\ rxn$

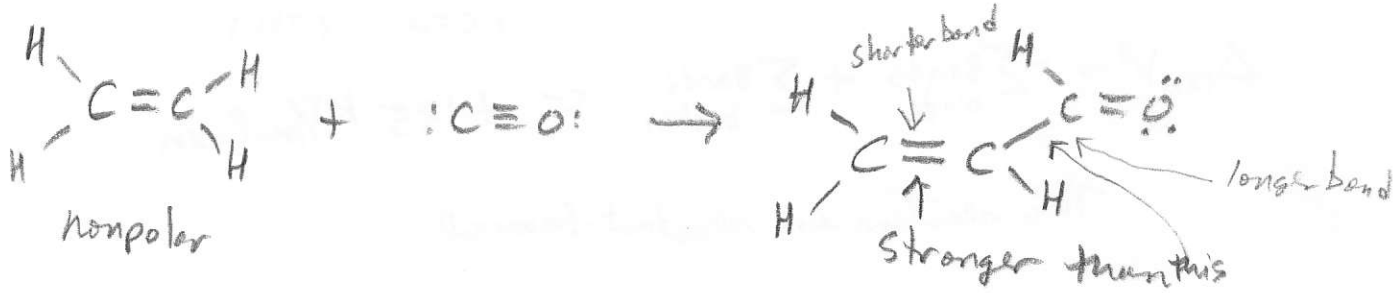
pretty good estimate!

The Ozone Bond energies are correlated w/ predicted Bond orders

Ch 8

58) Bond lengths – predicted from atomic radii

C-F < C-O < C-N < C-C < C-B

81) 

Reactant: 4 C–H, 1 C=C, 1 C≡O

Products: 4 C–H, 1 C=C, 1 C–C, 1 C=O

Net?

1 C≡O ⟶ 1 C–C + 1 C=O

1046 ⟶ 346 + 745

$\Delta_{rxn}H^{\circ} \approx -346-745+1046 = -45 \frac{kJ}{mol\ rxn}$

predicted to be exothermic (barely)