Question # 77582, answer

For the reaction $Cl_2(g) + 2Fe^{2+}(aq) \rightleftharpoons 2Fe^{3+}(aq) + 2Cl^-(aq)$ (1) the value of E_o is 0.59 V.

The value of E_o for $Fe^{3+}(aq) + Cl^-(aq) \rightleftharpoons 1/2\ Cl_2(g) + Fe^{2+}(aq)$ (2) is
-1.18 V
-0.59 V
-0.30 V
0.30 V
0.59 V

Answer:

1) Compare reactions (1) and (2). Reaction (2) may be derived from reaction (1) by reversing it (E_0 then will have equal value with the opposite sign):

$2Fe^{3+}(aq) + 2Cl^-(aq) \rightleftharpoons Cl_2(g) + 2Fe^{2+}(aq)$ E_0 = - 0.59 V ; Reaction (3)

2) Second step is to divide reaction (3) by 2. E_0 will be twice smaller as well:

$Fe^{3+}(aq) + Cl^-(aq) \rightleftharpoons 1/2\ Cl_2(g) + Fe^{2+}(aq)$ E_0 = -0.59 /2 = - 0.295 V

Correct answer is -0.295 V (-0.30 V)

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