Answer on the question #63489, Chemistry / General Chemistry

Question:

How many grams are in 1 Eq of Al3+?

Solution:

Equivalent weight, in chemistry, the quantity of substance that reacts with, or is equal to the combining value of, an arbitrarily fixed quantity of an another substance in a particular reaction. Substances react with each other in stoichiometric, or chemically equivalent, proportions, and a common standard has been adopted. For an element the equivalent weight is the quantity that combines with or replaces 1.00797 grams (g) of hydrogen or 7.9997 g of oxygen; or, the weight of an element that is liberated in an electrolysis (chemical reaction caused by an electric current) by the passage of 96,500 coulombs of electricity. / Encyclopedia Britannica.

As Al^{3+} has charge +3 and thus replaces 3 ions of hydrogen; its equivalent weight will be the molar mass divided by 3:

$$m\left(\frac{1}{3}Al\right) = \frac{M(Al)}{3(eq\ mol^{-1})} \cdot 1(eq) = \frac{26.981539(g\ mol^{-1})}{3(eq\ mol^{-1})} \cdot 1(eq) = 8.9938\ g.$$

Answer: 8.9938 g.