

how many atoms there are in 54.9 grams of water?

In order to calculate amount of atoms we need to know the amount of water (mol). To have it we can use next formula:

$$\nu = \frac{m(H_2O)}{2M(H) + M(O)};$$

$$\nu = \frac{54.9}{18} = 3.05 \text{ mol}$$

For number of water atoms we have to use Avogadro constant ($N_A = 6.02 \cdot 10^{23} \text{ mol}^{-1}$)

$$N = \nu \cdot N_A;$$

$$N = 3.05 \cdot 6.02 \cdot 10^{23} = 1.84 \cdot 10^{24}$$

There are $1.84 \cdot 10^{24}$ atoms in 54.9 g of water