The Amount of Gas in a Cylinder

There are two simple methods for **estimating** the weight of gas in a compressed gas cylinder.

1) The tare weight of standard compressed gas cylinders can be found at the link below. The cylinder can be weighed and the tare weight subtracted to give the gas weight.

www.scottecatalog.com/ScottTec.nsf/74923c9ec562a6fb85256825006eb87d/ef6a526eb60a3c8785256a2c0040b17e?OpenDocument

2) The ideal gas law can be used to estimate the number of moles of gas present in a cylinder. This number of moles multiplied by the molecular weight of the gas will yield the gas weight. (Note, this method will not work for substances that can liquefy in high pressure gas cylinders, e.g. ammonia and carbon dioxide.)

For example:

$$PV = nRT$$

where P = pressure (atm), V = volume (L), n = moles (mol),
$R = 0.08206\ L \bullet atm \bullet K^{-1} \bullet mol^{-1}$, T = temperature (K)

The tank pressure can be measured with a regulator (we'll assume 2000 psi, or 136.1 atm for this example). The above link reports the internal volume of compressed gas cylinders. R is a constant and temperature can be assumed to be 298 K. For a type "A" cylinder:

$$(136.1\ atm)(43\ L) = n(0.08206\ L \bullet atm \bullet K^{-1} \bullet mol^{-1})(298\ K)$$

$$n = 483.4\ mol$$

For a cylinder of methane (MW = 16.04) gas:

$$\left(\frac{483.4\ mol\ CH_4}{1}\right)\left(\frac{16.04\ g}{1\ mol\ CH_4}\right)\left(\frac{1\ pound}{454\ g}\right) = 17.1\ pounds$$