D *The Mole Picnic*

The Group of Exceedingly Excellent Know-alls of Science (GEEKS) are out on a biology field trip, attempting to find some moles. They have stopped for a picnic and are presently pouring some tea.

a) Everest opens a 1 g packet of sugar to put in his tea. What chemical amount of sugar is he adding (in moles)? Sugar is sucrose, which has the formula $C_{12}H_{22}O_{11}$.

b) Everest takes one sip of his tea and spits it out. It is too cold. The GEEKS must heat up the tea, but their only source of fuel is coal (assume this is pure carbon). Everest says that 83 moles of carbon will make a nice fire, although where he gets this number from is anyone's guess. He tells Gillian to get it. What mass of coal would Gillian have to carry?

c) Gillian thinks that Everest should go and get the coal himself. They start arguing and Gillian playfully throws 556 moles of water over Everest. What mass is this? What is the volume of the water?

d) After a brief water fight, Everest and Gillian decide that it is not worth arguing anymore. Gillian passes Everest his 5 g titanium bracelet and Everest gives Gillian his 2 g gold pendant. Who gives the greater amount of substance (in moles) in this peace offering?

e) As they settle down to a spot of mole watching, Everest asks "hey Gillian, pass me the knife so I can cut some of this delicious brownie." More like a demand, but that's his way. "Which one, the 50g silver or the 100g iron?" asks Gillian. Being difficult, Everest wants the one that contains the greatest amount of substance. How many moles of substance does each knife have, and which knife does Everest get?

f) It is dark and Gillian and Everest are getting cold. They decide they need urgent rescue from this trip, not having spotted any moles. Gillian reaches into her pocket to find that she has a flare containing 2g of magnesium. How many moles of magnesium is this?
How many moles of oxygen are needed to burn it?

g) Did they see any moles?