

Re: Mass and Energy

Source: <http://sci.tech-archive.net/Archive/sci.physics/2004-09/0496.html>

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Date: 09/01/04

Date: 1 Sep 2004 09:47:47 -0700

Keith P Walsh <keith.p.walsh@btinternet.com> wrote in message news:<uvi4j05bjh472rh47nv2dkkln9md39j2os@4ax.com>...

> *The following is from the textbook "Chemistry", Fourth Edition, by
> Steven S. Zumdahl, Houghton Mifflin Company, 1997; and it relates to
> how the equation $E=mc^2$ is used to calculate the amount of matter
> converted into energy in the combustion reaction of methane with
> oxygen:*

>
> *"Consider now that this reaction is exothermic, releasing 890 kJ of
> heat. The only way in which energy can be released is if the products
> of the reaction have a smaller mass than the reactants –after all, the
> energy released is a result of the conversion of some mass into
> energy. This mass equivalent of the 890 kJ can be calculated by
> Einstein's equation of mass/energy equivalence:"*

>
> *To see the calculation go to:
>
> <http://www.yk.psu.edu/~jhb3/cotw06.htm>*

>
> *I think that the reason why some "scientists", who may have had a only
> a partial grounding in the theory of chemistry, appear to find
> examples such as this completely baffling might be because their
> education has misled them into believing that the "binding energy"
> which keeps the molecules of the reactants together does not
> contribute to their mass.*

>
> *An excellent book titled "Einstein's Universe" (ISBN 0563175923) has
> been written which gives an informative insight into these matters.
> It's author is Nigel Calder, a renowned scientist and author on
> scientific subjects, who has this to say regarding the dynamics of
> energy and matter in an ordinary combustion reaction:*

>
> *"If you burn hydrogen gas in oxygen gas you create water, but you also
> produce a lot of light and heat. Energy, or mass, has been expelled
> from the material. So even before you make any measurements you can be
> sure, by Einstein's rule (I.e. $E=mc^2$), that the water must be lighter
> in weight than the hydrogen and oxygen that made it."*

>

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- > *I would suggest that anyone who is unable to recognise the veracity of*
- > *this statement doesn't really understand what the equation $E=mc^2$*
- > *means.*
- >
- > *Would anyone disagree?*
- >
- > *Keith P Walsh*

Sure Keith, I would disagree.

First, when you burn hydrogen gas in oxygen, the flame is essentially invisible.

Second, the heat from a hydrogen/oxygen torch has a high temperature, but produces very little heat. In pop science demonstrations, this allows you to run your hand through the flame and then turn around and melt fused quartz.

This impresses only the tourists in the crowd.

Of course this is simply a demonstration of simple chemistry, and since the products of combustion of hydrogen and oxygen exactly equate to the mass of the inputs, $E=MC^2$ is not demonstrated.

I believe you need to learn to distinguish nuclear reaction from simple chemical reactions, as does Nige Calder (but this is only my opinion).

Harry C.