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REPORT ON A RADIOACTIVE CARBON MONOXIDE EXPERIMENT PERFORMED ON 4 MARCH 1945.

By Cornelius A. Tobias

The solid phase of the boron oxide target used in this work contained approximately 50 millicuries of activity at the onset of the experiment. After about 60 minutes delay, the salt was scraped off the target which could be accomplished only after bending the 1/8" copper plate serving as a base for the target and thus breaking the salt off. The salt was then placed in a 1" diameter quartz tube and heated to a temperature of about 700 degrees. The open end of the tube was connected to an evacuated glass bulb, and about 3/4 of the total activity was found in the glass bulb after the salt was heated. We tried to obtain the radioactive carbon monoxide phase of the gas sample in the glass bulb by passing it through our filtering system, which took the carbon dioxide out. Only 1/10 of the total activity went with the gas phase, 2/3 of which was CO₂ activity, and 1/3 of which was carbon monoxide. Most of the activity, however, remained in the few water drops in the bottom of the glass bulb. By adding more water, we were able to transfer the whole activity to a test tube, and after boiling and adding hydrochloric acid, we hoped that some of the activity would go out from the liquid in the form of carbon dioxide or carbon monoxide gas. This, however, did not happen. Checking the half life of the decaying activity, we found it to agree with the 21 minutes known for carbon eleven. If this process is to be repeated in the future experiments, we would suggest to add a certain amount of carbon monoxide to the glass bulb into which the freed gases from the heated salt will be used.

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By Cornelius A. Tobias

The solid phase of the boron oxide target used in this work contained approximately 50 millicuries of activity at the onset of the experiment. After about 60 minutes delay, the salt was scraped off the target which could be accomplished only after bending the 1/4" copper plate serving as a base for the target and thus breaking the salt off. The salt was then placed in a 1" diameter quartz tube and heated to a temperature of about 700 degrees. The open end of the tube was connected to an evacuated glass bulb, and about 3/4 of the total activity was found in the glass bulb after the salt was heated. We tried to obtain the radioactive carbon monoxide phase of the gas sample in the glass bulb by passing it through our filtering system, which took the carbon dioxide out. Only 1/10 of the total activity went with the gas phase, 2/3 of which was CO₂ activity, and 1/3 of which was carbon monoxide. Most of the activity, however, remained in the few water drops in the bottom of the glass bulb. By adding more water, we were able to transfer the whole activity to a test tube, and after boiling and adding hydrochloric acid, we hoped that some of the activity would go out from the liquid in the form of carbon dioxide or carbon monoxide gas. This, however, did not happen. Checking the half life of the decaying activity, we found it to agree with the 21 minutes known for carbon eleven. If this process is to be repeated in the future experiments, we would suggest to add a certain amount of carbon monoxide to the glass bulb into which the freed gases from the heated salt will be used.

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See Tobias - see folder

CARBON MONOXIDE EXPERIMENT -- #2

March 17, 1945

Using the same set up as in previous experiment #1--for the metabolizer and for the purification apparatus, this experiment is considered still exploratory and had no improvements added by Dr. Roughton and Dr. Root. The two traps in the apparatus, for the removal of CO₂ from the bombarded sample contained 0.3 normal NaOH and to this was added (after the gas had bubbled thru) 0.15 normal BaCl₂ for precipitation of BaCO₃.

The B₂O₃ was bombarded in the cyclotron with about 5 microamperes hours of deuterons. An evacuated 500 cc bulb containing about 25 mm CO and 25 mm CO₂ was then attached to the target chamber (approximately volume 50 cc.) and brought to equilibrium with it. The bulb was then closed and brought over to Denver for determination of activity against radius standard. It was then given to Turpin and he passed this gas thru the precipitation apparatus (see results below). It should be stated here however that the second precipitate (sample 2) was quite active and the first precipitate (sample 1) was strongly active. The gas remaining after passing through these 2 traps was then collected in the leveling bulb. Its volume was _____ cc. A fraction of this, _____ cc. was taken by Turpin and passed thru the CuO furnace and precipitated in 0.3 normal NaOH plus 15 normal BaCl₂. This was sample 3 and was also active.

The remainder of the purified sample (_____ cc.) was then introduced into the metabolizer, to which 150 cc. of CO had been previously introduced by Doctors Roughton and Root. Dr. Root, the subject, had already had a nervous blood sample taken for blank determination. He then breathed from metabolizer for approximately 8 minutes--closed circuit--exhaling through the bubbling bottle as above. The precipitate from this was sample 4. After approximately 20 minutes on air, he again breathed thru the bubbling bottle for a similar period of time. This was sample 5. Neither sample 4 or 5 proved to contain any activity. Thus there is no evidence of conversion of CO to CO₂ by the body in this experiment.

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Criticisms of experiment

1. CO₂ not completely removed from sample before introduction into etablor.
2. Present method of removal of CO₂ is also too time consuming even though it were a reliable method.
3. Exhalation resistance is too great for subject.

The tracer technique and set up, would seem to be satisfactory, but the chemical and physiological aspects of the experiment need improvement by Doctors Roughton and Root. Also there must be marked decrease in the time used in completing the experiment.

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