CONCLUSIONS

We conclude that we can expect a chain reaction to take place in a sufficiently large mass of graphite which contains, for instance, a close-packed hexagonal or cubic lattice of uranium spheres. The capture cross-section of carbon is likely to be smaller than the upper limit so far established and consequently there is hope that moderately large masses of graphite and uranium or uranium oxide will be sufficient to reach the point of divergence at which nuclear transmutation can be maintained at an intensity which is limited only by the necessity of avoiding over heating.

Large quantities of radio-active elements will be produced directly from the splitting uranium atoms and indirectly by the intense neutron emission. The necessity of protecting human beings from deadly irradiations emanating from the chain reaction will undoubtedly limit the scope of practical applications, and perhaps will slow down the industrial development of this field but it is difficult to imagine that practical applications should not follow in due course of time the present turn of events in physics.

In so far as the production of power for practical purposes is concerned the crucial question which will determine the scope of applications is now whether the rare isotope of uranium 235 or the abundant isotope 238 is the active agent in the thermal neutron reaction. If the rare isotope is the active agent ten tons of uranium may become exhausted by the chain reaction after having supplied as much power as can be obtained from about fifty thousand tons of coal. In case of the other alternative, ten tons of uranium could supply more power than five million tons of coal without being used up. Though N. Bohr put forward interesting arguments in support of the view that it is the rare isotope which is split by thermal neutrons this question will have to be decided by direct observations performed on small samples of the separated isotopes. Only after some such observation shall we be able to express a well balanced opinion upon the immediate future of "atomic engineering."