

note, and to G. R. Lee for assistance with the experimental work.

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¹ Middlebrook, W. R., and Phillips, H., *J. Soc. Dyers Col.*, **57**, 137 (1941).

² Blackburn, S. (unpublished observations).

³ Middlebrook, W. R., *Nature*, **164**, 501 (1949).

⁴ Bergmann, M., and Fruton, J. S., *J. Biol. Chem.*, **117**, 189 (1937).

⁵ Sanger, F., *Biochem. J.*, **39**, 507 (1945).

⁶ Blackburn, S., *Nature*, **163**, 955 (1949); *Biochem. J.*, **45**, 579 (1949).

⁷ Bergmann, M., Zervas, L., and Fruton, J. S., *J. Biol. Chem.*, **115**, 593 (1936).

Low-Temperature Decomposition of Rocks, Ores and Minerals by Sodium Peroxide using Platinum Vessels

RECENT work at the Dominion Laboratory on the decomposition and analysis of refractory minerals has led to the belief that the lower the temperature of decomposition using the common fluxes the more soluble are the products in water or acids. The time for complete decomposition at the correct temperature for the flux appeared to be only a few minutes or even less.

The effectiveness of sodium peroxide as a decomposing agent is well known; but its usefulness has been limited by its corrosive action on the vessel used during prolonged heating at high temperatures. Experiments have shown, however, that such prolonged heating and high temperatures are unnecessary with this reagent, and that many refractory minerals can be effectively decomposed by heating with sodium peroxide for a few minutes only at a temperature below 500° C. In these experiments a platinum crucible was used, and after repeated decompositions no attack on the platinum could be detected.

The finely powdered mineral, ground to pass a 240 B.S.S. sieve, was mixed with sodium peroxide in the ratio of 1:4 in a platinum crucible and covered with a light layer of peroxide. The crucible was placed for seven minutes in a muffle furnace held at a temperature of 480° ± 20° C. On removal, the crucible was cooled quickly and the readily detachable sintered cake dropped into 50–100 ml. of cold water. Rapid and complete disintegration took place either in the alkaline solution so formed or on acidifying by the rapid addition of acid to the cold suspension.

The method outlined appears to be applicable to a wide variety of inorganic compounds and should be particularly useful in treating some minerals hitherto regarded as difficult to decompose. So far it has been used successfully to decompose the following: chrome refractory, bauxite, flint clay, zircon, chromite, wolfram, scheelite, rutile, magnetite, garnet, cassiterite, titanite, beryl, black ilmenitic sand, glass sand, greensand, gypsum, celestine, baryta, feldspar, basalt, rhyolite, trachyte, andesite and osmiridium. The last-named required four successive treatments before complete solution was attained. Caution is indicated in heating sulphides with sodium peroxide, as the heat of reaction may result in temperatures high enough to cause attack on the vessel used.

The mechanism of the reaction with sodium peroxide and its application to the assay of ores, in-

organic analysis, the preparation of salts and the possible recovery of metals from their ores are being investigated further.

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Acetylation of Sulphanilamide by Acetyl Metaphosphate

THE problem regarding the nature of the reactive, intermediate C₂-compound in acetate metabolism is not clear at present. With regard to biological acetylations, it is evident, especially from Lipmann's¹ work, that a strongly acetylating substance is formed in an enzymatic reaction between acetate and adenosine triphosphate. According to Lipmann's recent papers², this intermediate is different from acetyl phosphate, but is transformed to acetyl phosphate in acid solution at room temperature. We have considered the possibility that the primary product in the phosphate transfer from adenosine triphosphate to an acceptor might be a metaphosphate compound. Some chemical and biological points in favour of this hypothesis will be discussed elsewhere.

Lipmann³ has shown that, in the enzymatic acetylation of sulphanilamide, acetyl phosphate is not able to replace adenosine triphosphate + acetate as acetylating agent. According to the above hypothesis, acetyl metaphosphate would be the primary product in the reaction between adenosine triphosphate and acetate. We have therefore studied the analogous non-enzymatic reaction with acetyl metaphosphate as acetyl donor, and observed a rapid acetylation of sulphanilamide.

Acetyl metaphosphate was synthesized by adding excess of silver metaphosphate to a solution of acetyl chloride (usually 1–5 gm.) in 25 ml. dioxane at 0° C. After shaking the mixture for about three days, no chlorine is found in the solution. After centrifugation, the solution is yellow to brown or black, depending on the amount of acetyl chloride used. Attempts to isolate acetyl metaphosphate by precipitation or by evaporation of the solvent resulted in the formation of dark products. Therefore the solution was used as such. Analysis of the solution gave values slightly higher for acetyl than for phosphorus.

1 ml. of the dioxane solution was mixed with 20 ml. of an aqueous solution of sulphanilamide in M/15 phosphate buffer, pH 7.5, at room temperature. The degree of acetylation was determined by coupling the non-acetylated diazotized sulphanilamide with N-ethyl α -naphthylamine (kindly supplied by H. Lundbeck and Co., Copenhagen) and photometric analysis according to Frisk⁴.

