As shown in Figure 1, the release rates of all oven-dried films were all very fast and nearly no different.

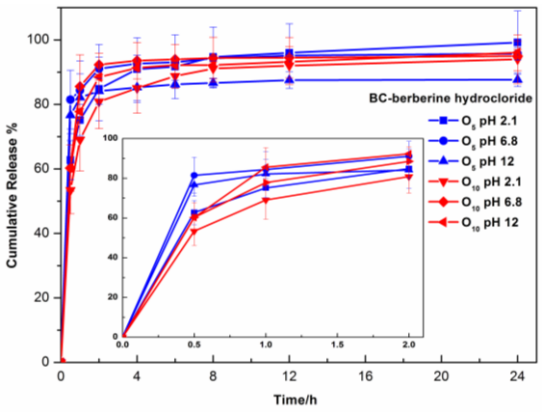

Fig. 1 Release properties for the O_{10} of BC-berberine hydrochloride and BC-berberine sulphate films in 900 mL SIF, H_2SO_4 solution, SGF, and NaOH solution at 37 ℃. Each data point is the average of six experiments ±standard deviation.

Figure 2 clearly illustrated the solubility of the two forms of drugs in the different pH solutions. The saturated solutions of two kinds of berberine were prepared: berberine hydrochloride 1.8 mg mL^{-1} while berberine sulphate 30 mg mL^{-1}. Only samples (a) and (d) in pH 2.1 HCl solution are muddy, the other samples are the clear solution. It was tested that the solubility of berberine hydrochloride reduced to 1.5 mg mL^{-1} (a). As mentioned before, berberine sulphate in HCl solution converts to berberine hydrochloride, therefore its solubility greatly decreased and most of drugs crystallized finally (d). For berberine sulphate (e-g), regardless of the changes of pH value of the external environment, the solubility is consistent. You can clearly see that these solutions show different colors in different pH environments. Under alkaline conditions, berberine converted to berberrubine, whose −OH replaces $–OCH_3$ connected to C19.

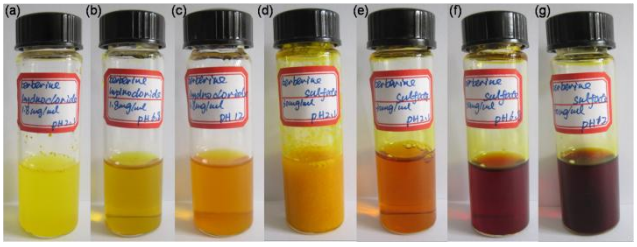

Fig. 2. Solubility of berberine hydrochloride (a-c) and berberine sulphate (d-g). (a) and (d) pH 2.1 HCl, (b) and (f) pH 6.8, (c) and (g) pH 12, and (e) pH 2.1 H_2SO_4