

Rheological features of poloxamine 908-based gelling systems

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INTRODUCTION

Poloxamines are X-shaped amphiphilic block copolymers made up of an ethylenediamine central portion linked to four chains of polyoxypropylene (POP)-polyoxyethylene (POE) (Figure 1a). This structure is characterized by peculiar thermo-responsive properties due to the capacity to self-assemble into micelles in aqueous solutions. Among these, **poloxamine 908** (P908) is a highly hydrophilic polymer (21 POP and 114 POE units per arms; HLB > 24) widely used as biomaterial [1]. The aim of this investigation was to evaluate the ability of P908 aqueous solutions to form gels and the influence of copolymer concentration and temperature on their rheological properties.

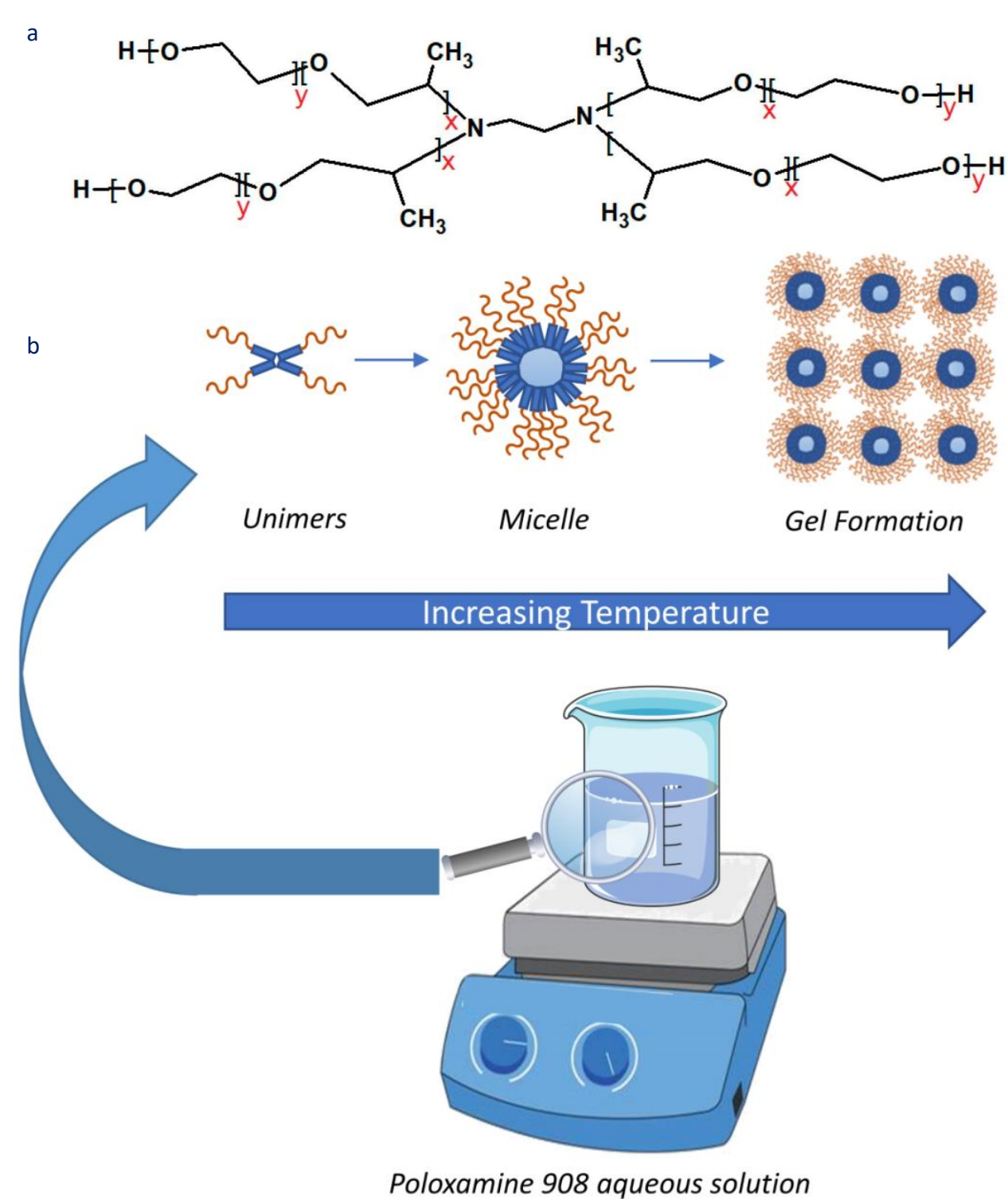
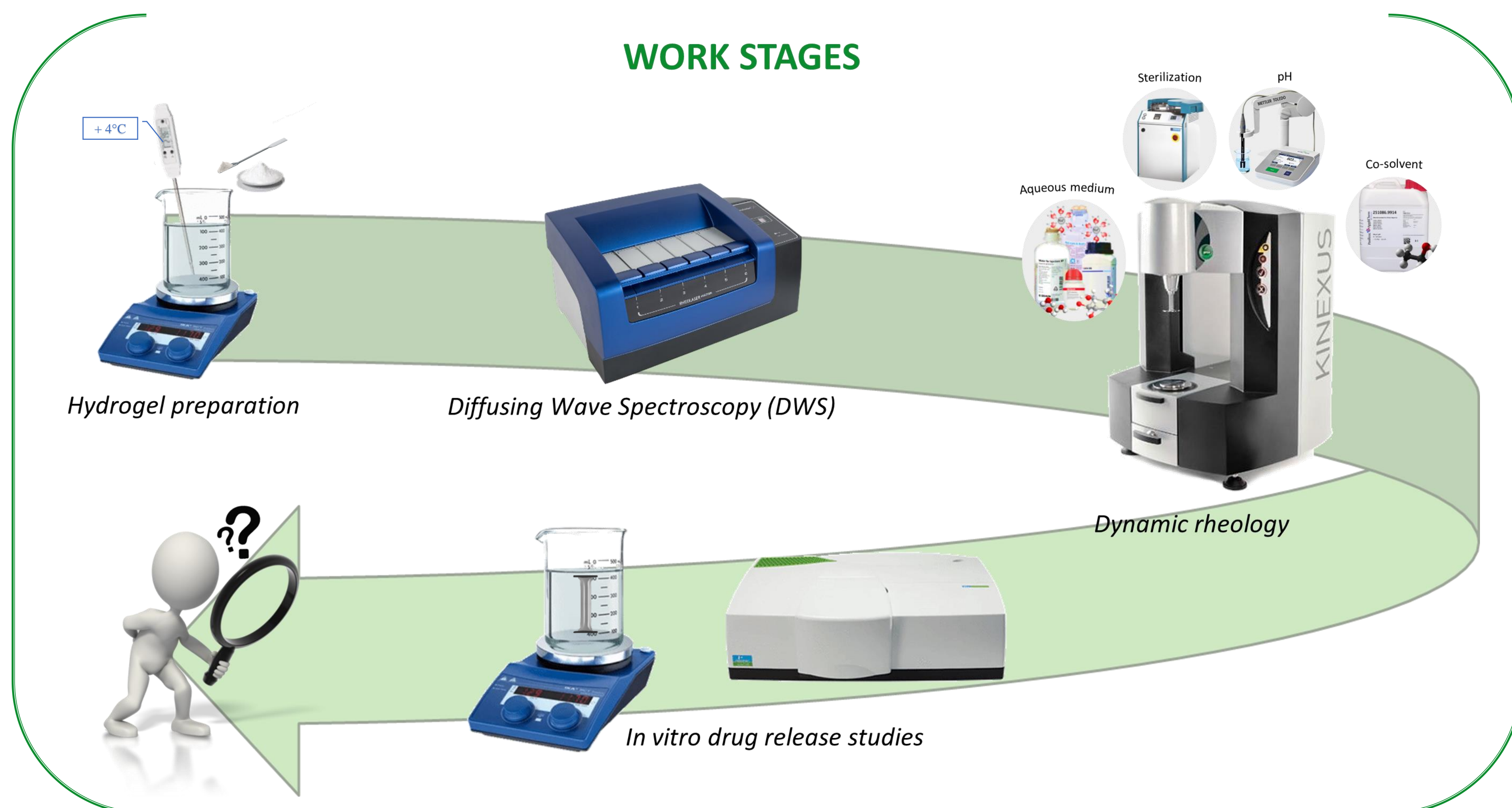


Figure 1. Chemical structure of poloxamines (a) and schematic representation of the gelation mechanism of a P908 aqueous “solution” (b).

Table 1. $T_{sol-gel}$ of the P908-based formulations

% P908 (w/w)	$T_{sol-gel}$ (°C)
15	> 50
20	>50
25	32.6
28	26.6
30	25.8
35	18.5



RESULTS

DIFFUSING WAVE SPECTROSCOPY

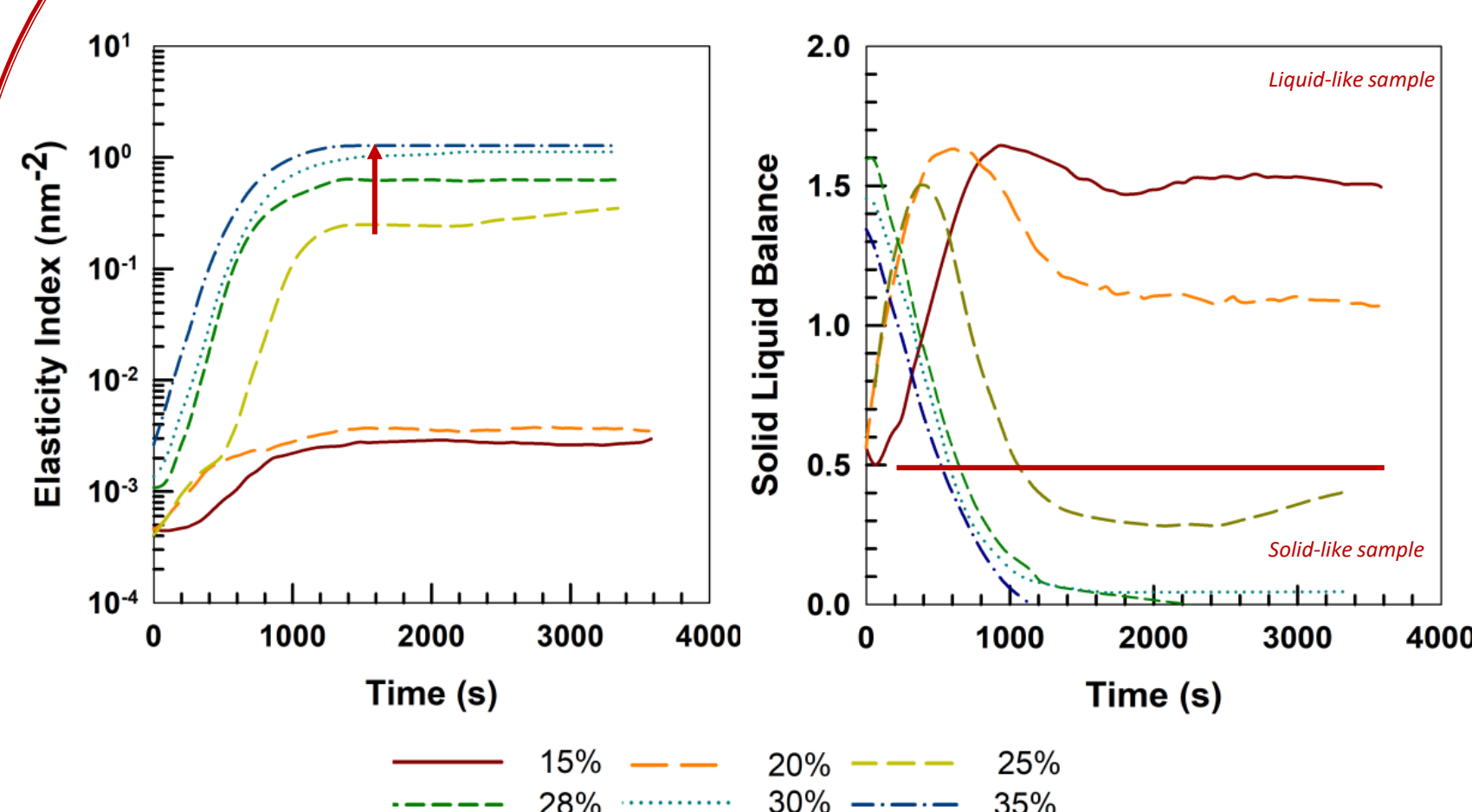


Figure 2. Elasticity index and Solid Liquid Balance profiles of P908 aqueous solutions as a function of the time. The analyses were performed at 37 °C.

IN VITRO DRUG RELEASED

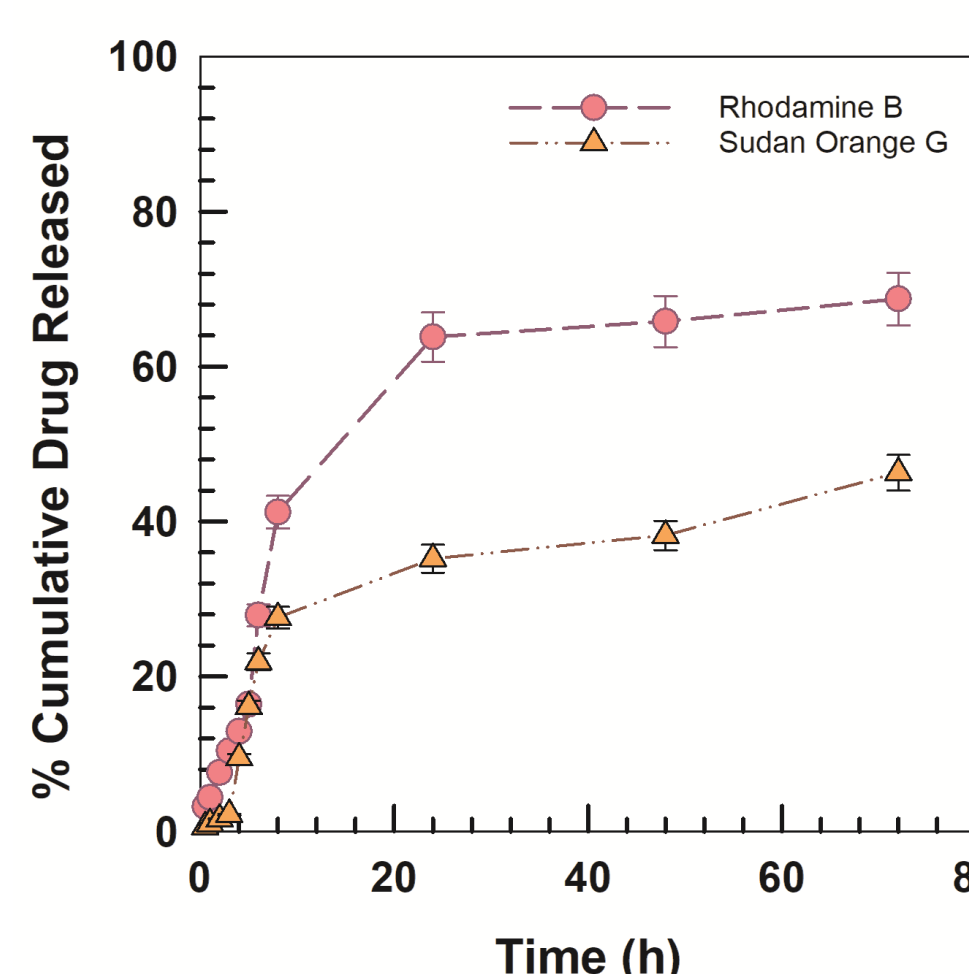


Figure 5. Release profiles of rhodamine B and sudan orange G (0.1% w/w) in PBS from P908 28%-based hydrogels. Experiments were performed at 37 °C.

IN VITRO CYTOTOXICITY

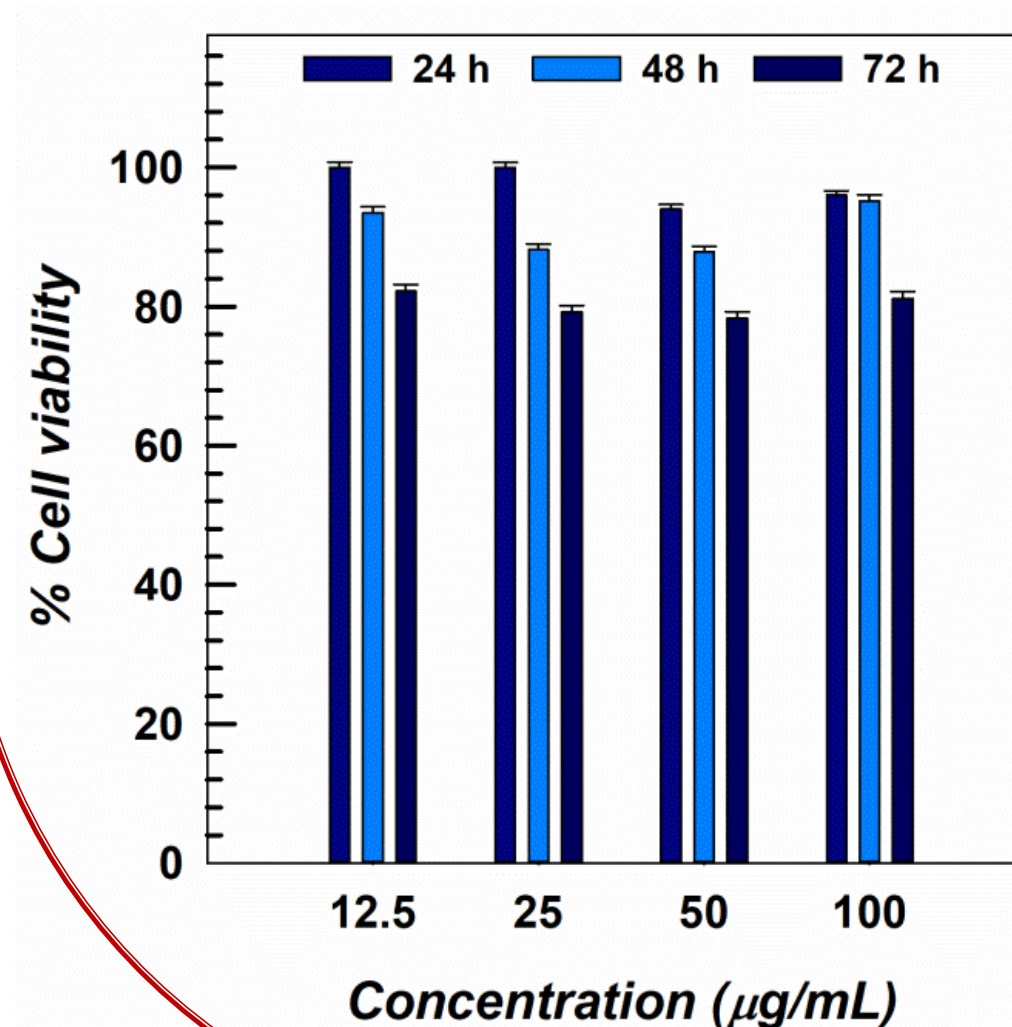


Figure 6. Evaluation of *in vitro* cytotoxicity of P908 on NCTC 2544 cells as a function of copolymer concentration and incubation time.

RHEOLOGICAL EVALUATION

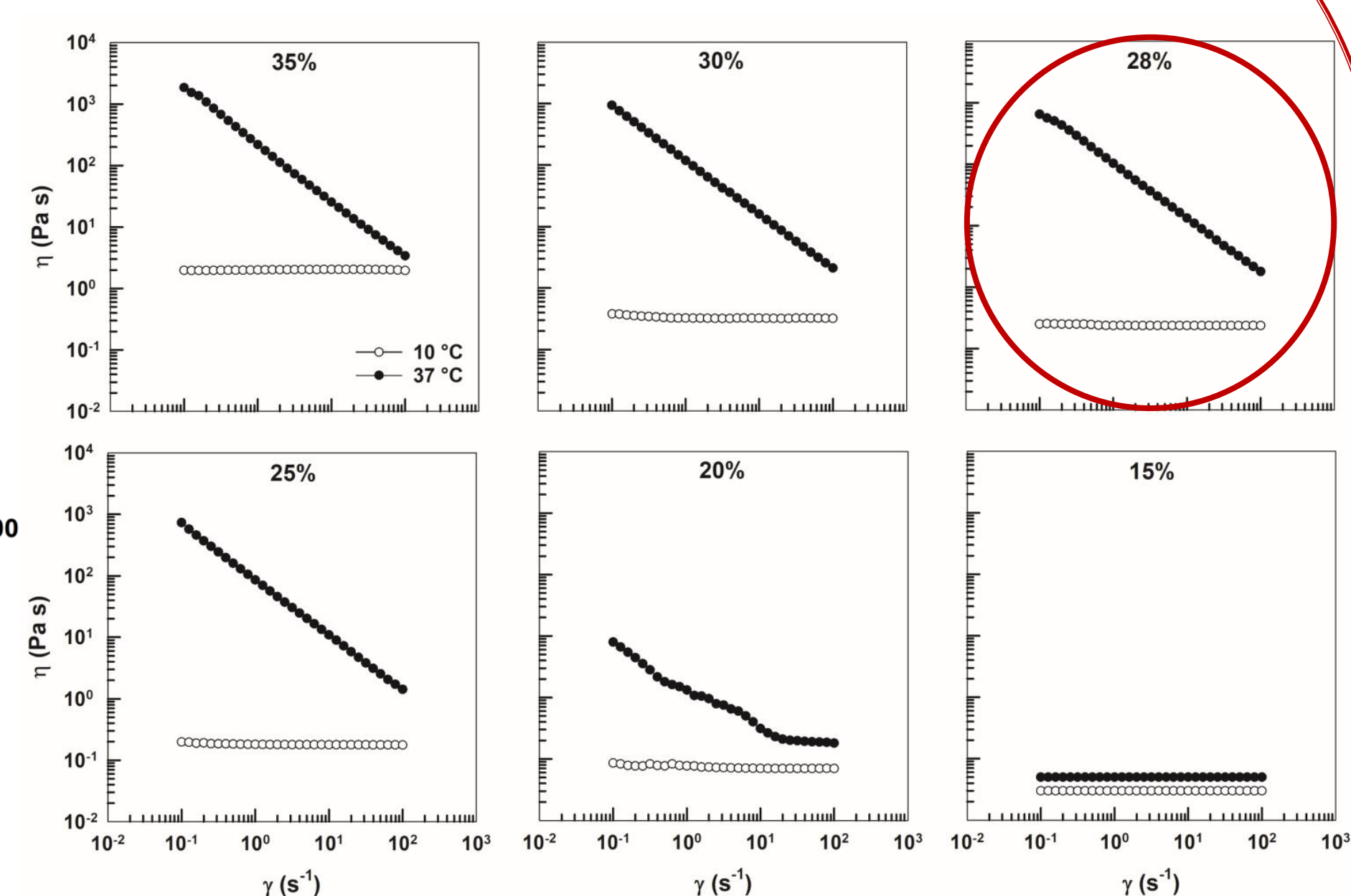


Figure 3. Shear rate viscosity of P908 solutions at 10 °C (white symbols) and 37 °C (black symbols).

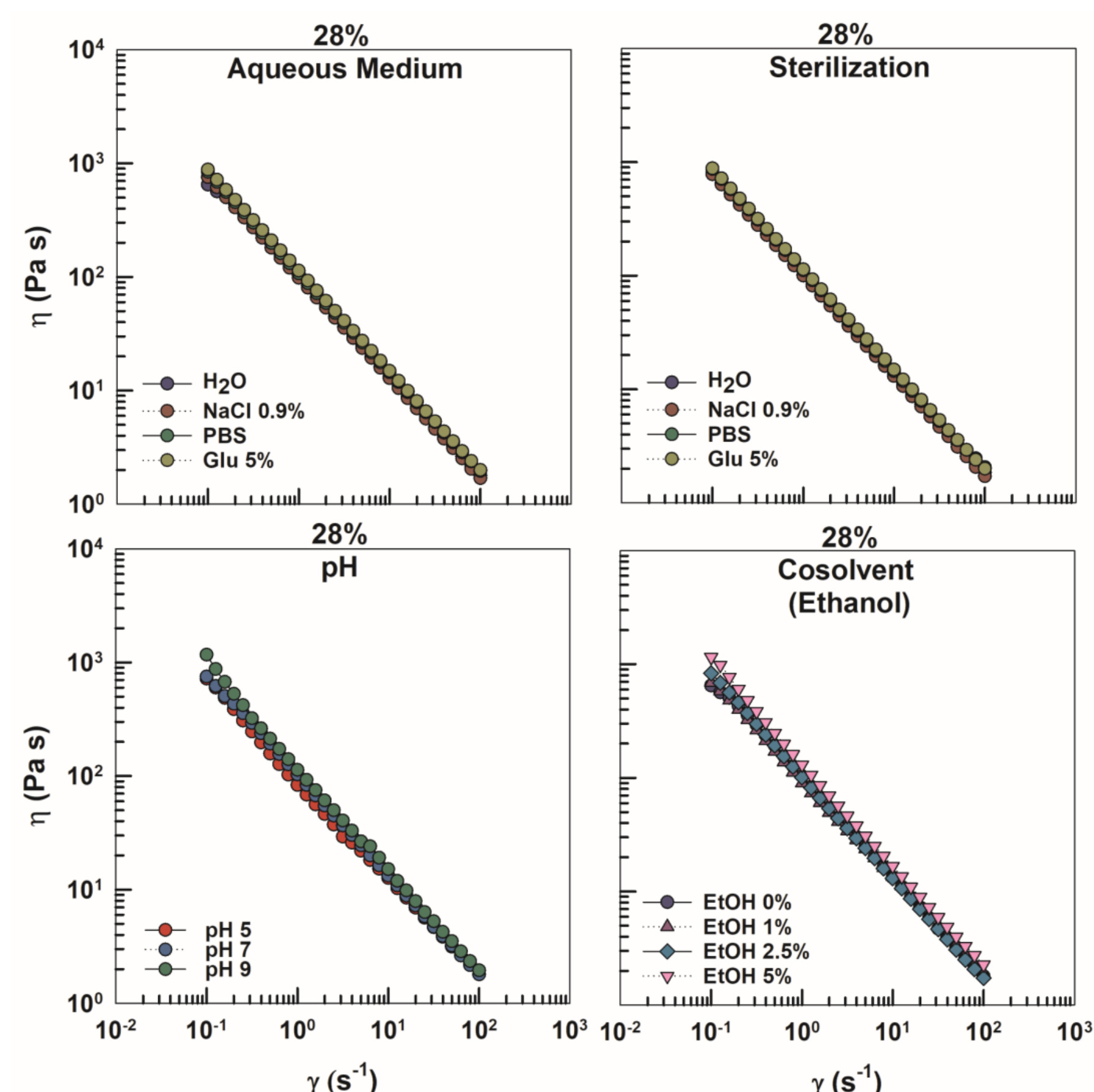


Figure 4. Shear rate viscosity of P908 28%-based hydrogels as a function of different factors. The analyses were performed at 37 °C.